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DIGITAL FINANCE FOR ALL: POWERING INCLUSIVE GROWTH IN EMERGING ECONOMIES

SEPTEMBER 2016

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DIGITAL FINANCE FOR ALL: POWERING INCLUSIVE GROWTH IN EMERGING ECONOMIES

SEPTEMBER 2016

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PREFACE

Financial services are the lifeblood of an economy, enabling households and businesses alike to save, invest, and protect themselves against risk. Yet in many emerging economies today, the majority of individuals and small businesses lack access to even basic savings and credit products, which hinders economic growth and perpetuates poverty.

Digital technologies starting with a mobile phone have the potential to resolve this problem. Households and businesses can use digital payments and financial accounts to interact seamlessly and efficiently, unleashing large gains in productivity and investment, and prompting greater financial inclusion. While a growing body of research has demonstrated the positive impact that both financial and digital inclusion can have on household welfare, little research to date has quantified the broad macroeconomic and societal benefits. This report aims to fill that gap.

The research was led by Susan Lund and James Manyika of the McKinsey Global Institute, and Olivia White and Marc Singer of McKinsey's Global Banking Practice. Chris Berry, Robin Perani, and Ben Austin led the project team, which comprised Laura Brodsky, Ritesh Jain, Tim Kudo, Esther Lee, Betsy Riley, and Alex Rose. Many other McKinsey colleagues worked closely with the project team to help shape this research, including Jonathan Ablett, Sukriti Bansal, Jaroslaw Bronowicki, Florent Istace, Szabolcs Kemeny, Alok Singh, and Soyoko Umeno.

This independent MGI initiative is based on our own research, the insights and experience of our McKinsey colleagues around the world, and McKinsey's Global Banking Practice and its collaboration with the Financial Services for the Poor team at the Bill & Melinda Gates Foundation. We owe a debt of gratitude to Jason Lamb, Daniel Radcliffe, and Rodger Voorhies of the Bill & Melinda Gates Foundation who were generous with their time and expertise. Our research was also enriched by insights of their colleagues, including Dilly Aberra, Pawan Bakhshi, Hugh Chang, Yixing "Anthony" Gao, Gargee Ghosh, Abi Jagun, SungAh Lee, Sebastian Majewski, Nachiket Mor (also Board Member of the Reserve Bank of India), and Haddis Tadesse. Finally, we thank Gillian LaFond and Nick Egan for their operational support that made the collaboration with the foundation possible.

MGI's academic advisers provided valuable insights and challenged our thinking. We extend sincere thanks to Martin N. Baily, Bernard L. Schwartz Chair for Economic Policy Development at the Brookings Institution; Rakesh Mohan, Professor in the Practice of International Economics of Finance, Yale University School of Management, and senior fellow of the Jackson Institute at Yale; and Laura Tyson, S. K. and Angela Chan Professor of Global Management at Haas School of Management, University of California at Berkeley. We are also grateful for the generous time and attention provided by the many other experts, business leaders, policy makers, and academics around the world who helped shape this report. They are listed following Chapter 4.

Thanks go to MGI senior editors Janet Bush, Colin Douglas, and Peter Gumbel; senior graphic designers Marisa Carder, Jason Leder, and Patrick White, and designer Margo Shimasaki; Richard Johnson, senior editor, data visualization; Tim Beacom and Karen Jones for their research expertise; Matt Cooke and Rebeca Robboy for their help on external communications; Julie Philpot, MGI's editorial production manager; and Chelsea Grewe and Deadra Henderson in MGI practice management. Many McKinsey colleagues around the world provided invaluable input and assisted in our field research. They include Salman Ahmad, Suparna Biswas, Eduardo Bolio, Alberto Chaia, Mutsa Chironga, Violet Chung, Bobby Demissie, Yran Dias, Xiyuan Fang, Aaron Flohrs, Vijay Gosula, Feng Han, David Jiang, Bill Jones, Jawad Khan, Prasad Lad, Akash Lal, Tomás Lajous, Joshua Lan, Flavio Litterio, Anu Madgavkar, Heitor Martins, Joe Ngai, Philip Osafo-Kwaako, John Qu, Joydeep Sengupta, Daniel Sujo, Sasi Sunkara, Renny Thomas, and Nicole Zhou.

This report contributes to MGI's mission to help business and policy leaders understand the forces transforming the global economy, identify strategic locations, and prepare for the next wave of growth. As with all MGI research, this work reflects our independent views and has not been commissioned by any business, government, or other institution. We welcome your comments on the research at **MGI@mckinsey.com**.

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IN BRIEF

DIGITAL FINANCE FOR ALL: POWERING INCLUSIVE GROWTH IN EMERGING ECONOMIES

Two billion individuals and 200 million businesses in emerging economies today lack access to savings and credit, and even those with access can pay dearly for a limited range of products. Rapidly spreading digital technologies now offer an opportunity to provide financial services at much lower cost, and therefore profitably, boosting financial inclusion and enabling large productivity gains across the economy. While the benefits of digital finance—financial services delivered via mobile phones, the internet or cards—have been widely noted, in this report we seek to quantify just how large the economic impact could be.

- Digital finance has the potential to provide access to financial services for 1.6 billion people in emerging economies, more than half of them women. It could increase the volume of loans extended to individuals and businesses by $2.1 trillion and allow governments to save $110 billion per year by reducing leakage in spending and tax revenue. Financial-services providers would benefit too, saving $400 billion annually in direct costs while sustainably increasing their balance sheets by as much as $4.2 trillion.
- Overall, we calculate that widespread use of digital finance could boost annual GDP of all emerging economies by $3.7 trillion by 2025, a 6 percent increase versus a business-as-usual scenario. Nearly two-thirds of the increase would come from raised productivity of financial and non-financial businesses and governments as a result of digital payments. One-third would be from the additional investment that broader financial inclusion of people and micro, small, and medium-sized businesses would bring. The small remainder would come from time savings by individuals enabling more hours of work. This additional GDP could lead to the creation of up to 95 million jobs across all sectors.
- The potential economic impact varies significantly depending on a country's starting position. We conducted field research in seven countries that span geographies and income levels: Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan. Lower-income countries such as Ethiopia, India, and Nigeria have the largest potential, with the opportunity to add 10 to 12 percent to their GDP, given low levels of financial inclusion and digital payments today. In comparison, middle-income countries such as China and Brazil could add 4 to 5 percent to GDP—still a substantial boost.
- The rapid spread of mobile phones is the game changer that makes this opportunity possible. In 2014, nearly 80 percent of adults in emerging economies had a mobile phone, while only 55 percent had financial accounts—and mobile phone penetration is growing quickly. Mobile payments can lower the cost of providing financial services by 80 to 90 percent, enabling providers to serve lower-income customers profitably. The data trail these technologies leave can enable lenders to assess the creditworthiness of borrowers, and can help businesses better manage their finances.
- Businesses and government leaders will need to make a concerted effort to secure these potential benefits. Three building blocks are required: widespread mobile and digital infrastructure, a dynamic business environment for financial services, and digital finance products that meet the needs of individuals and small businesses in ways that are superior to the informal financial tools they use today.

Broadening access to finance through digital means can unlock productivity and investment, reduce poverty, empower women, and help build stronger institutions with less corruption—all while providing a profitable, sustainable business opportunity for financial service providers. The benefits for individuals, businesses, and governments can transform the economic prospects of emerging economies.

THE POWER OF DIGITAL FINANCE

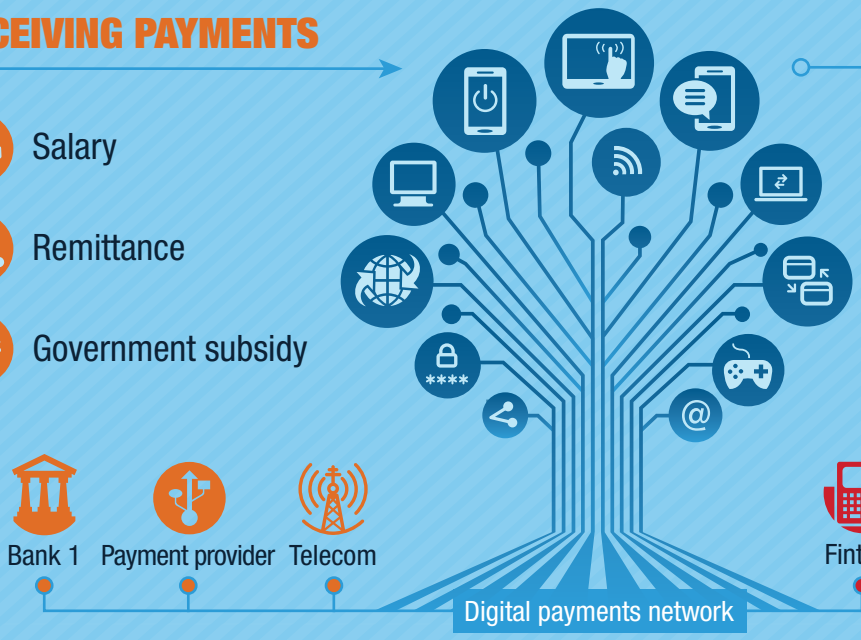
TRANSFORMING HOW PEOPLE TRANSACT

RECEIVING PAYMENTS

- Salary
- Remittance
- Government subsidy

MAKING PAYMENTS

- Utility bill
- School fee
- Convenience store



THE POTENTIAL ECONOMIC IMPACT

1.6 BILLION
newly included individuals

$4.2 TRILLION
in new deposits

$3.7 TRILLION
(6%) GDP boost by 2025

95 MILLION
New jobs

$110 BILLION
annual reduction in government leakage

$2.1 TRILLION
in new credit

THREE REQUIRED BUILDING BLOCKS

Widespread digital infrastructure

Widespread connectivity, robust digital payments infrastructure, and well-disseminated personal identification system

Dynamic financial services market

Risk-proportionate regulation promoting stable financial system and open markets fostering innovation

Products people prefer to existing alternatives

New digital products offering true advantage in cost and utility for people to use them

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EXECUTIVE SUMMARY

Most people and small businesses in emerging economies today do not fully participate in the formal financial system.[1] They transact exclusively in cash, have no safe way to save or invest money, and do not have access to credit beyond informal lenders and personal networks. Even those with financial accounts may have only limited product choice and face high fees. As a result, a significant amount of wealth is stored outside the financial system and credit is scarce and expensive. This prevents individuals from engaging in economic activities that could transform their lives. Economic growth suffers.

Digital finance offers a transformational solution, and one that could be implemented rapidly and without the need for major investment of costly additional infrastructure (see Box E1, "What is digital finance?"). Banks, telecoms companies, and other providers are already using mobile phones and other readily available technologies to offer basic financial services to customers. Using digital channels rather than brick-and-mortar branches dramatically reduces costs for providers and increases convenience for users, opening access to finance for people at all income levels and in far-flung rural areas. For businesses, financial service providers, and governments, digital payments and digital financial services can erase huge inefficiencies and unlock significant productivity gains.

In this report, we take a comprehensive approach to quantifying the economic and social impact of digital finance in emerging economies. We use McKinsey's proprietary general equilibrium macroeconomic model and detailed inputs from field research in seven emerging economies that cover a range of geographies and income levels: Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan. We find that widespread adoption and use of digital finance could increase the GDP of all emerging economies by 6 percent, or $3.7 trillion, by 2025.

Stakeholders across these countries would benefit. Some 1.6 billion unbanked people could gain access to formal financial services; of this total, more than half would be women. An additional $2.1 trillion of loans to individuals and small businesses could be made sustainably, as providers expand their deposit bases and have a newfound ability to assess credit risk for a wider pool of borrowers. Governments could gain $110 billion per year from reduced leakage in public spending and tax collection—money that could be devoted to other priorities. The resulting increase in aggregate demand could create nearly 95 million new jobs across all sectors.

Capturing this opportunity will require concerted effort by business and government leaders. The rewards are substantial. Rather than waiting a generation for incomes to rise and traditional banks to extend their reach, emerging economies have an opportunity to use mobile technologies to provide digital financial services for all, rapidly unlocking economic opportunity and accelerating social development.

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[1] In this report, we use the terms "developing countries" and "emerging economies" interchangeably, and we use "advanced economies" and "developed countries" interchangeably. We follow the IMF definition of developing countries. See technical appendix for the list of countries included.

Box E1. What is digital finance?

We define digital finance as financial services delivered over digital infrastructure—including mobile and internet—with low use of cash and traditional bank branches. Mobile phones, computers, or cards used over point-of-sale (POS) devices connect individuals and businesses to a digitized national payments infrastructure, enabling seamless transactions across all parties.

Our definition is intentionally broad, including:

- All types of financial services, such as payments, savings accounts, credit, insurance, and other financial products.
- All types of users, including individuals at all income levels, businesses of all sizes, and government entities at all levels.
- All types of providers of financial services, including banks, payment providers, other financial institutions, telecoms companies, financial technology (fintech) start-ups, retailers, and other businesses.

We also use a number of related, but slightly different, terms that are frequently used in policy discussions and other publications. By "digital wallets", we refer to a store of value that people can access using a mobile phone or a computer and that provides an easy way to make payments, ranging from person-to-person transfers to e-commerce transactions, to purchases at a store. A digital wallet may be linked to a traditional bank account. "Mobile money" refers to mechanisms allowing people to make payments using their mobile phones without having a traditional bank account. We use "digital financial inclusion" to mean providing people with digital financial services. This can be providing services to those who are currently unbanked as well as giving currently underserved individuals and businesses access to a wider and more appropriate set of digital finance products.

$3.7T OR 6%

could be added to developing world GDP in 2025 from widespread digital finance

FINANCIAL EXCLUSION AFFECTS THE MIDDLE CLASS, NOT ONLY THE POOR

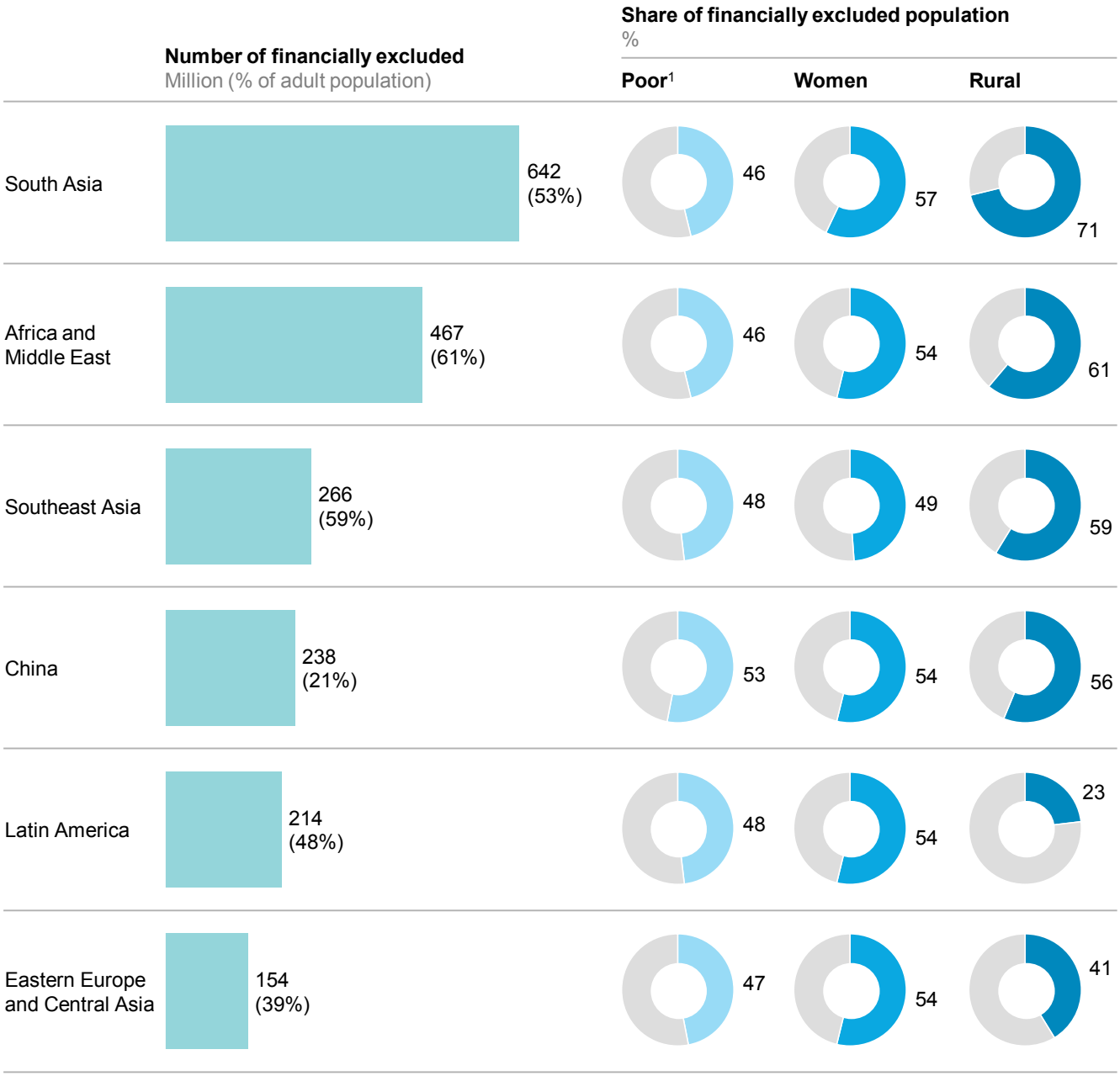
In emerging economies as a whole today, 45 percent of adults—or two billion individuals—do not have a financial account at a bank or another financial institution, or with a mobile-money service. The share is higher in Africa, the Middle East, Southeast Asia, and South Asia, and is particularly high among poor people, women, and those living in rural areas—but many middle class people are also affected (Exhibit E1). Even those people who do have basic financial accounts lack access to the broad range of financial services that those in developed countries take for granted, such as different types of savings accounts, loans, and insurance products.[2] As a result, the majority of people in emerging economies rely on informal financial solutions that are often less flexible and more expensive than formal alternatives—and frequently fail to deliver when needed the most. These include saving in the form of livestock, gold, or through informal savings groups, and borrowing from family, employers, or money lenders.

[2] Global Findex database 2014, World Bank, April 2015.

Exhibit E1

Who are the financially excluded?

Financially excluded population in emerging economies



1 Defined as the bottom two quintiles of each country's income distribution.

SOURCE: Global Findex database 2014, World Bank; McKinsey Global Institute analysis

Access to financial products is also a problem for businesses. At least 200 million micro, small, and medium-sized enterprises (MSMEs) in emerging economies have no or insufficient access to credit, blocking their growth. The gap between the amount of credit currently extended and what these businesses need is estimated to be $2.2 trillion (Exhibit E2). The problem is not limited to very small and informal businesses—medium-sized and small companies in the formal economy, which have the potential to be major job-creation and growth engines, account for about half of the gap.[3] Even when businesses can obtain credit, the collateral required tends to be double or triple that in advanced

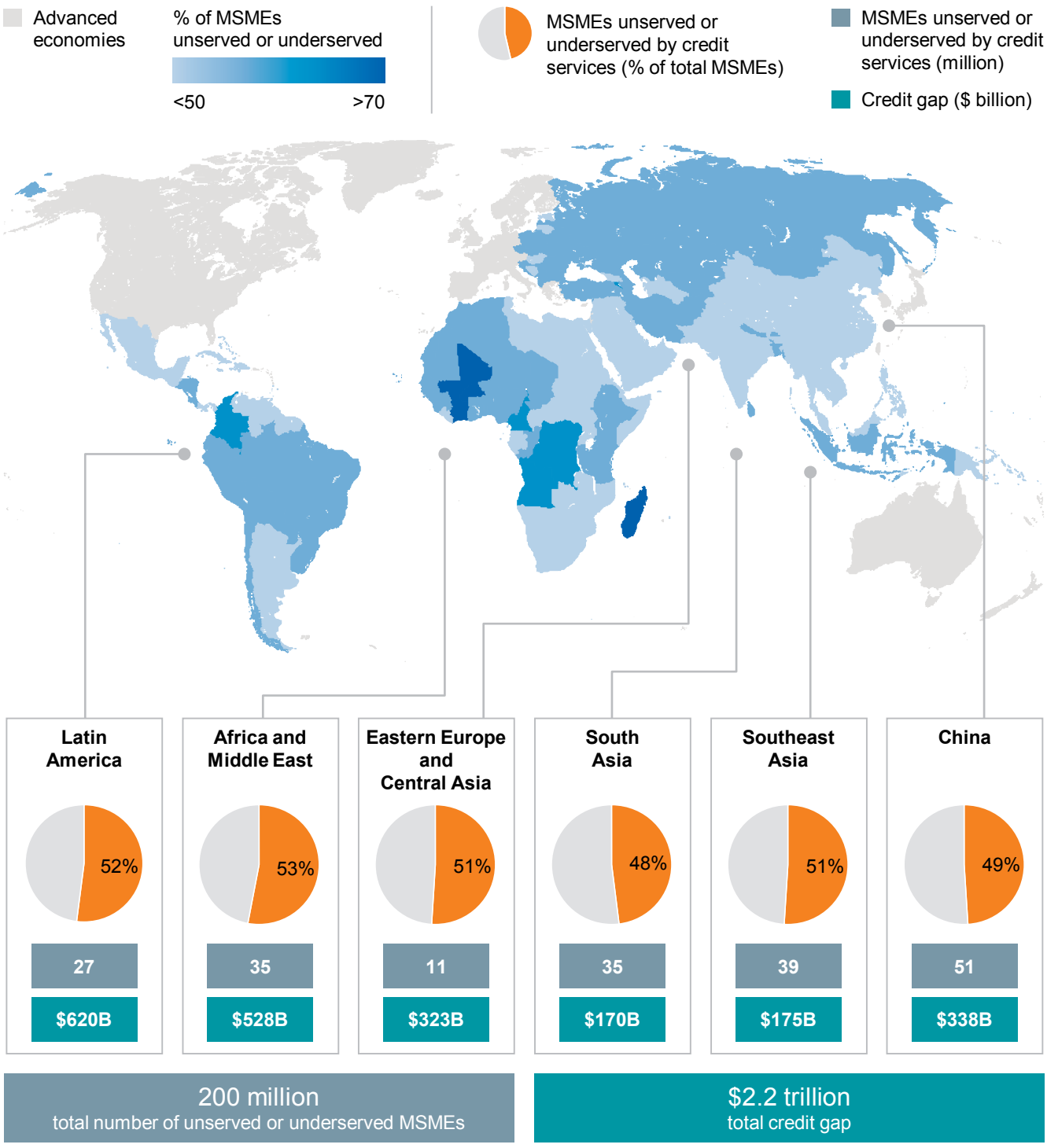
[3] IFC Enterprise Finance Gap database 2011,SME Finance Forum, 2013.

economies, and interest rates are many times higher, too.[4] MSMEs in emerging economies cite credit constraints as the biggest obstacle to their growth.[5]

Exhibit E2

Micro, small and medium-sized enterprises across developing regions cannot access the credit they need to grow

2013



SOURCE: SME Finance Forum; McKinsey Global Institute analysis

[4] Era Dabla-Norris at al., *Distinguishing constraints on financial inclusion and their impact on GDP, TFP, and inequality*, NBER working paper number 20821, January 2015.

[5] *Small and medium enterprise finance: New findings, trends and G-20/Global Partnership for Financial Inclusion progress*, Global Partnership for Financial Inclusion and International Finance Corporation, 2013.

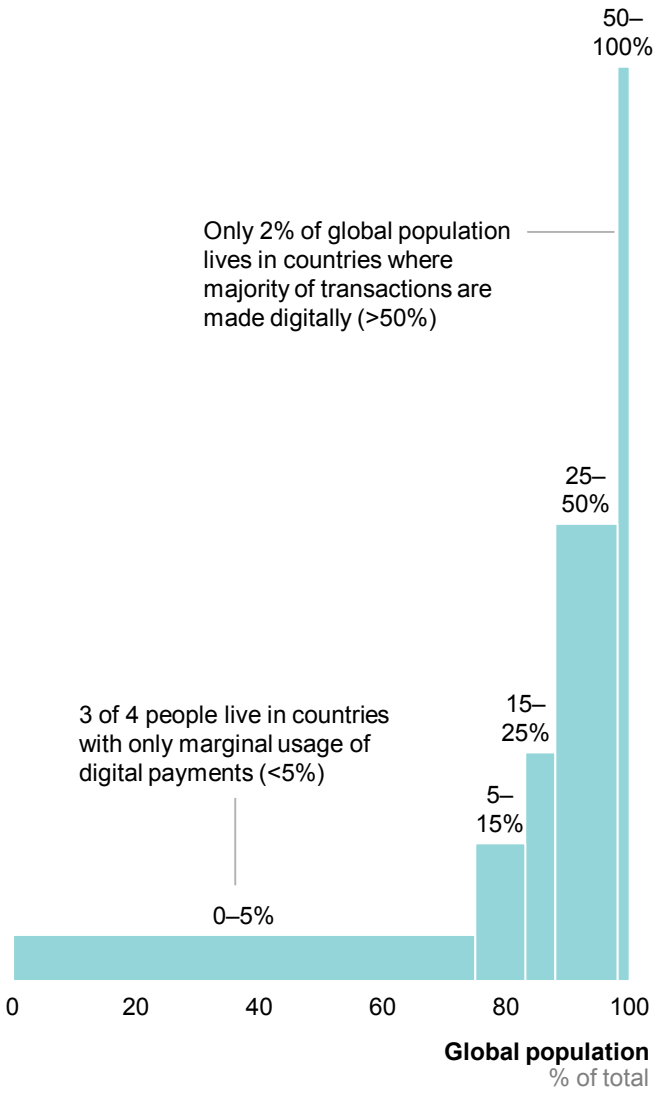
A heavy reliance on cash hinders financial institutions, too. Individuals and businesses of all sizes overwhelmingly use cash, which accounts for more than 90 percent of payment transactions by volume in emerging economies (Exhibit E3). For financial institutions, this creates significant costs and reduces the pool of customers that they can serve profitably. Reliance on cash also makes it difficult for financial-services providers to gather the information they need to assess the creditworthiness of potential borrowers, which further narrows the pool of customers they can serve.

Exhibit E3

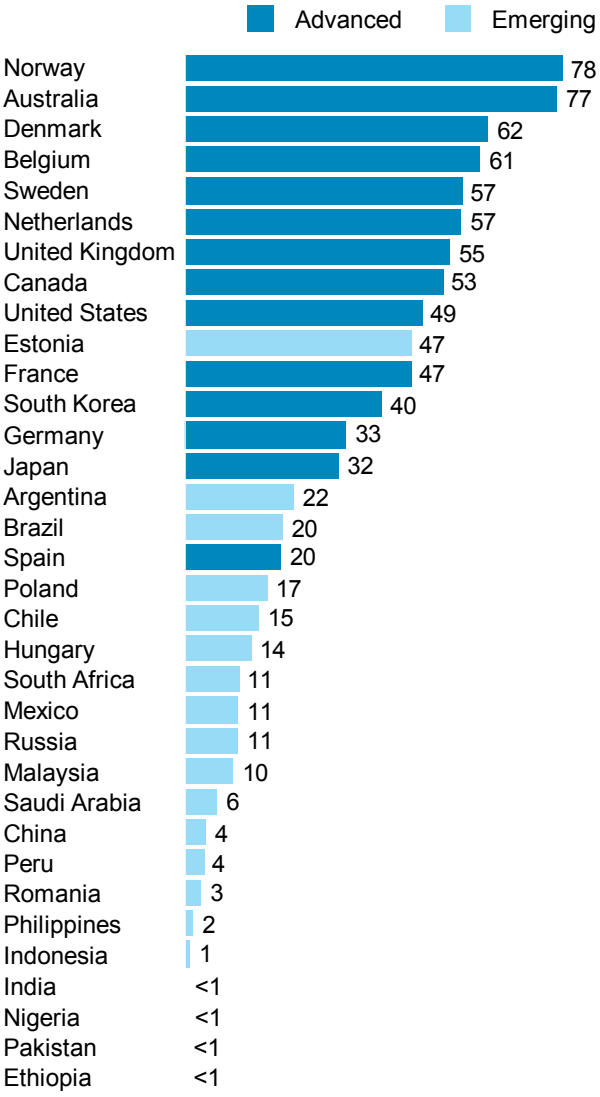
The vast majority of payments in emerging economies use cash, while digital payments are widely used in advanced economies

% of total transactions by volume, 2014

Share of digital payments—global aggregate



Share of digital payments—by country



SOURCE: McKinsey Global Payments Map; World Bank; McKinsey Global Institute analysis

For governments, the predominance of cash creates a leaky pipeline for expenditure and tax revenue and can enable corruption.[6] One study found that as much as one-third of government cash payments can be lost this way.[7] Social programs built on cash payments and subsidized goods such as fuel and food staples also limit governments' ability to target aid and subsidies effectively. The International Monetary Fund (IMF) estimates that 43 percent of the benefit of fuel subsidies worldwide goes to the wealthiest quintile and only 7 percent to the poorest quintile.[8] Finally, cash payments reinforce large informal economies that not only hinder competition but also deprive governments of precious tax revenue and can deter business investment.

DIGITAL TECHNOLOGIES ENABLE BROAD-BASED FINANCIAL INCLUSION

80–90%
lower cost from providing digital rather than physical accounts

Mobile and digital technologies, which are spreading around the world at extraordinary speed and with disruptive power, can change this situation. In emerging economies, the next frontier is finance.

For most people in these countries, the story begins in the palm of their hand, with a mobile phone. This can provide easy access to a digital wallet that could be used for all payment transactions, such as receiving remittances, wages, and government subsidies, making purchases at stores, or paying utility bills and school fees. Using a mobile phone rather than cash saves considerable travel time and cost, reduces the risk of theft, and boosts convenience. It also gives access to a broader range of financial services that can be delivered digitally, such as savings accounts or loans.

Mobile phones are becoming ubiquitous as networks increase coverage and quality. Mobile networks now reach more than 90 percent of people in emerging economies. Phone ownership still lags behind network coverage, but it too is growing rapidly. In 2014, nearly 80 percent of adults in emerging economies had mobile subscriptions, compared with 55 percent who had a financial account. Mobile phone ownership is projected to reach over 90 percent of adults by 2020.[9]

For financial-services providers, the cost of offering customers digital accounts can be 80 to 90 percent lower than using physical branches (Exhibit E4). This enables providers to serve many more customers profitably, with a broader set of products and lower prices. Over time, many individuals may begin to use their digital accounts to save money for the future.

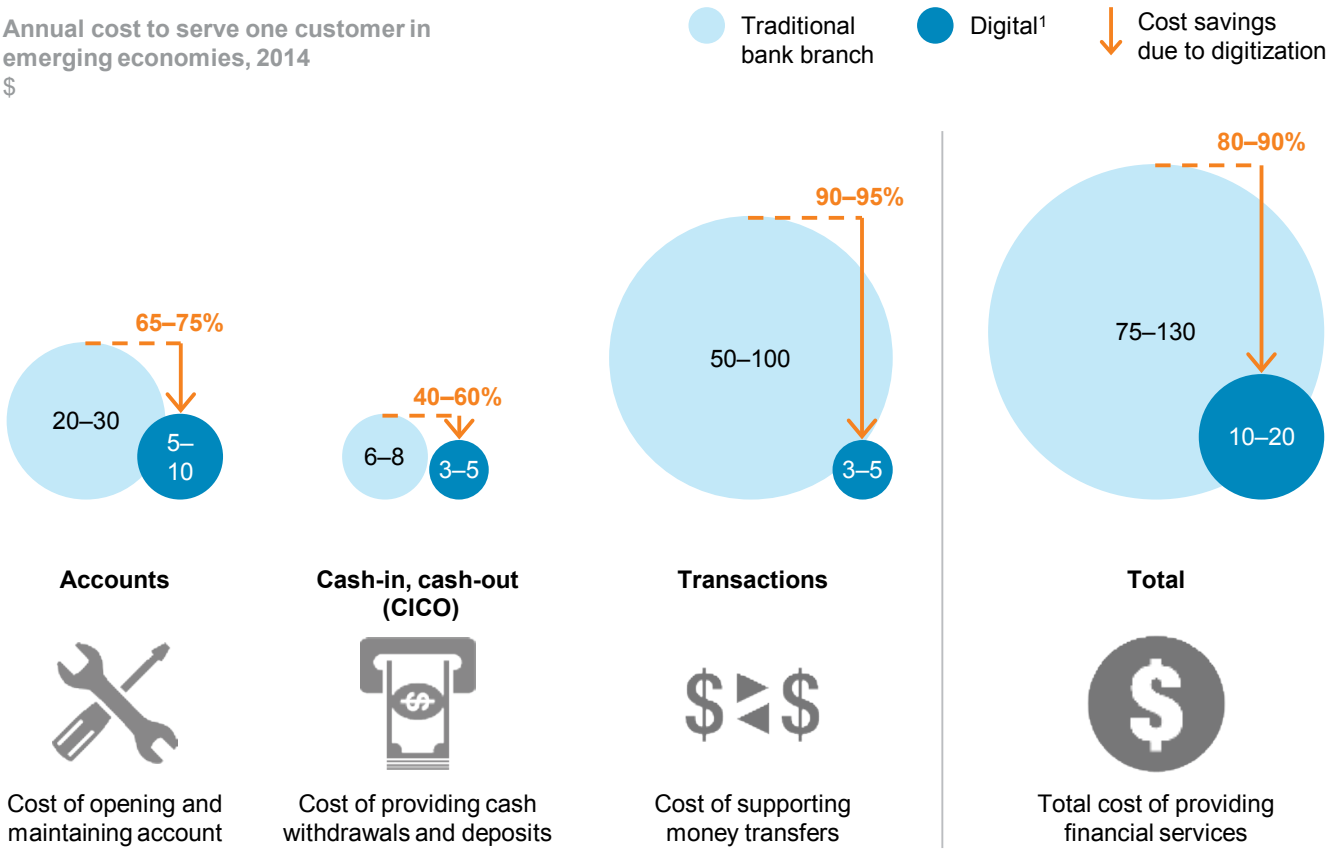
As individuals and businesses make digital payments, they create a data trail of their receipts and expenditures, that enables financial service providers to assess their credit risk. The information allows providers to underwrite loans and insurance policies for a larger set of borrowers with greater confidence. Providers can also collect digital repayments on an automated basis—and send text messages to prompt borrowers when they have missed a payment. Research in Bolivia, Peru and the Philippines has found that when providers use such SMS "nudges", household saving rates increase.[10] The full suite of savings, credit, and insurance products becomes cost-effective to provide even for people at low incomes and for very small businesses.

6 See Kenneth S. Rogoff, *The curse of cash*, Princeton University Press, 2016.
7 *From cash to digital transfers in India: The story so far*, Consultative Group to Assist the Poor, February 2015.
8 Arze del Granado, Javier, David Coady, and Robert Gillingham, *The unequal benefits of fuel subsidies: A review of evidence for developing countries*, IMF working paper number 10/202, September 2010.
9 GSMA Intelligence Database, 2016.
10 Dean Karlan et al., *Getting to the top of mind: How reminders increase saving*, NBER working paper number 16205.

As more individuals and businesses use digital payments and other digital products, the benefits to all users increase, creating network effects that can further accelerate adoption.[11] In Kenya, for example, the share of adults using the M-Pesa mobile-money system grew from zero to 40 percent within its first three years of launching in 2007—and by the end of 2015 stood at nearly 70 percent.[12] This rate of adoption is much faster than it is in the case of traditional financial accounts, which tends to increase in line with national income levels. Achieving a significant expansion of access to finance through brick-and-mortar branches could take a generation or more. In contrast, the use of mobile-money accounts shows no correlation with income; indeed, the example of Kenya shows that the highest penetration today is in some of the world's poorest countries.

Exhibit E4

Digital technologies cut the cost of providing financial services by 80 to 90 percent



1 To reach full cost savings, sufficient improvements are necessary in system design, scale, and operational efficiencies.

SOURCE: McKinsey Global Payments Map; Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems,* Bill and Melinda Gates Foundation, September 2013; McKinsey Global Institute analysis

[11] Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems*, Bill and Melinda Gates Foundation, September 2013.

[12] Ignacio Mas and Dan Radcliffe, "Mobile payments go viral: M-Pesa in Kenya," *Journal of Financial Transformation*, volume 32, 2011.

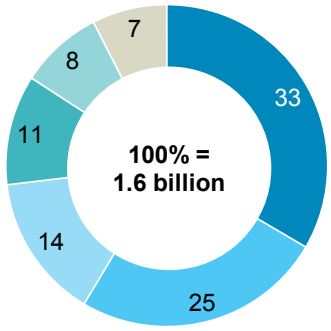
DIGITAL FINANCE COULD BOOST THE GDP OF EMERGING ECONOMIES BY $3.7 TRILLION BY 2025 AND BENEFIT NUMEROUS STAKEHOLDERS

Our research takes a comprehensive approach to quantifying the potential economic and social benefits of digital finance. Individuals, businesses, financial-services providers, and governments all stand to gain. Collectively, the benefits can significantly boost GDP and job creation (Exhibit E5).

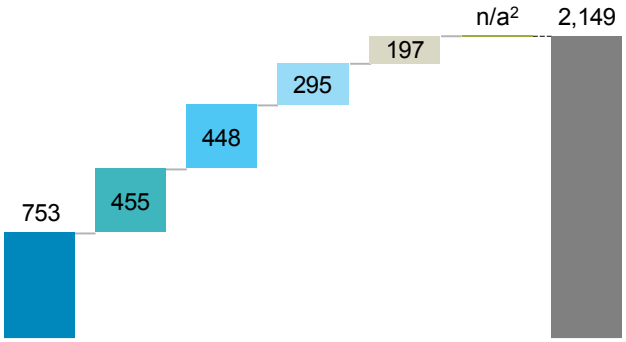
Exhibit E5

Many stakeholders stand to gain from digital financial services

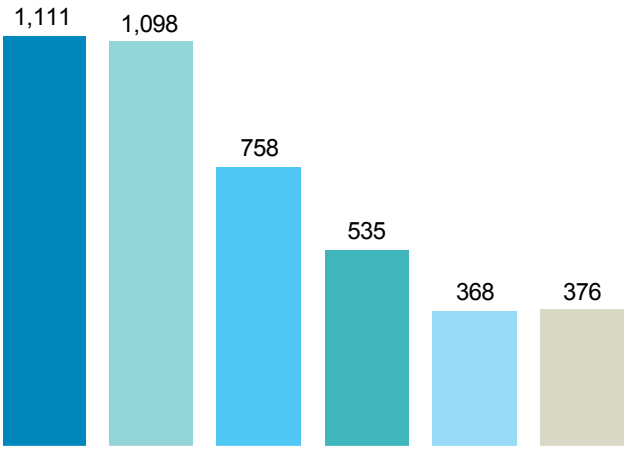
Individuals — **1.6 billion**
Newly included in financial system
%



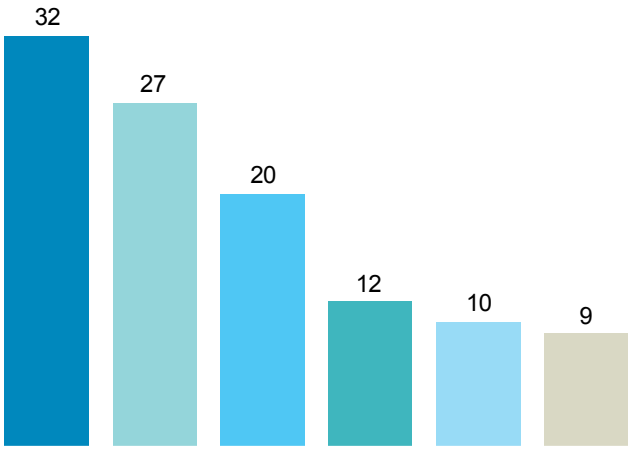
MSMEs and individuals — **2.1 trillion**
New credit
$ billion



Financial-service providers — **4.2 trillion**
New deposits
$ billion



Government — **110 billion**
Leakage reduction per annum
$ billion



1 Stakeholder benefits are calculated using 2014 baseline values.
2 New credit in China has not been forecasted as current debt levels in the country are already very high.
NOTE: Not to scale. Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

- **Individuals.** Digital finance could give 1.6 billion individuals access to a financial account for the first time, 45 percent of whom would come from the poorest two quintiles of the income distribution. More than half of the total—880 million—would be women. Previous research has found that when women have financial accounts, they tend to spend more than men on food, education, and health care, increasing the welfare and productivity of their family.[13] For all individuals, convenience, cost, and the range of financial products available would dramatically improve. People in towns and cities would no longer have to spend valuable business hours in line at a bank; rural households could forgo trips to nearby towns and spend more time on income-generating activities. One study, in rural Niger, showed that payments made via digital means saved an average of one-hour travel time and more than three hours of waiting time per transfer.[14] Across society, people could improve their management of income and expenses, save for big-ticket items like durable goods, invest in their farms and businesses, and put money aside for unexpected economic shocks. In Malawi, farmers whose income from crop sales was deposited directly into accounts spent 13 percent more on inputs for their future crops and achieved a 21 percent average increase in yields from the following year's harvest in comparison to farmers who received payment in cash.[15] Digital finance can help to reduce poverty and hunger, raise gender equality, and improve access to education and health care.

- **Businesses.** Digital payments create an electronic record of sales and expenses, enabling businesses to improve their tracking and analysis of cash flow, streamline management of suppliers, and enhance their understanding of operations and customers. One example is iZettle, a payment processor operating in Brazil, Mexico, and 11 other countries. Through a smartphone app, it enables small businesses to process digital payments, track and evaluate their sales data, and monitor profitability, raising their productivity and profitability. Digital records for revenue and expenditure also enable businesses to demonstrate their credit quality to lenders. Combined with the deposits gathered from newly included individuals, we calculate that digital finance could unlock an additional $2.1 trillion of loans to individuals and MSMEs, helping productive but credit-constrained businesses expand operations and invest in new technologies.

- **Financial-services providers.** Digital finance offers significant benefits—and a huge new business opportunity—to providers. By improving efficiency, the shift to digital payments from cash could save them $400 billion annually in direct costs. As more people obtain access to accounts and shift their savings from informal mechanisms, as much as $4.2 trillion in new deposits could flow into the financial system—funds that could then be loaned out. To unleash the full range and potential of new forms of digital finance, however, a much wider variety of players than banks will likely be involved. These may include telecoms companies, payment providers, financial technology startups, microfinance institutions (MFIs), retailers and other companies, and even handset manufacturers.

- **Governments.** Governments in emerging economies could collectively save at least $110 billion annually as digital payments reduce leakage in public expenditure and tax revenue. Of this, about $70 billion would come from ensuring that government spending reaches its target. This effectively would increase public investment in critical areas such as education, infrastructure, and health care. In addition, governments could gain approximately $40 billion annually from ensuring that tax revenue that is

[13] Mattias Doepke and Michele Tertilt, *Does female empowerment promote economic development?* Centre for Economic Policy Research, discussion paper number 8441, June 2011.

[14] Jenny C. Aker et al., *Payment mechanisms and anti-poverty programs: Evidence from a mobile money cash transfer experiment in Niger*, CDG working paper number 268, July 2015.

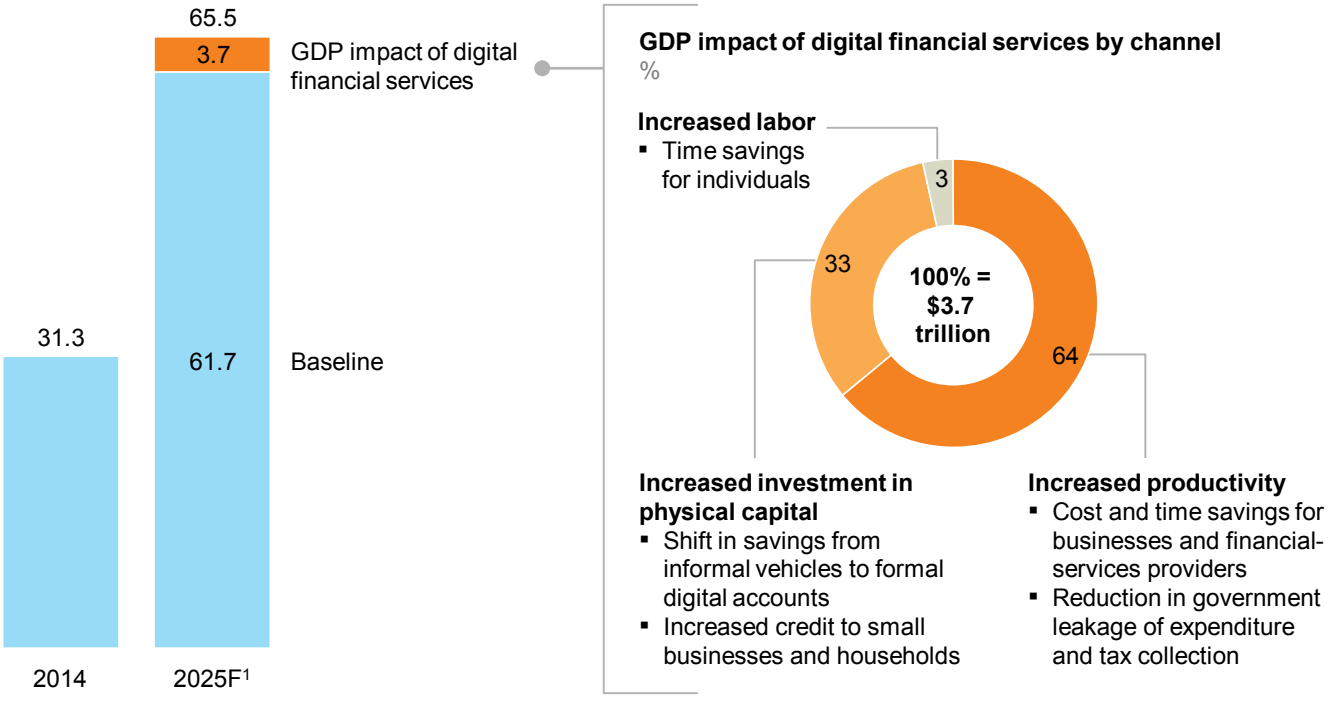
[15] Lasse Brune et al., *Facilitating savings for agriculture: Field experimental evidence from Malawi*, NBER working paper number 20946, February 2015.

collected makes its way into government coffers, money that could be used to fund other priorities.[16] Governments could also enjoy other benefits that we did not quantify. Digital payments could further enhance revenue by reducing the size of the informal economy where businesses do not register, pay taxes, or comply with product- and labor-market regulations. Digital operations within government can create large efficiency improvements and therefore cost savings. Shifting social programs from cash to digital payments can also improve outcomes through better targeting of recipients.

To calculate the impact on GDP, we use McKinsey's proprietary general equilibrium macroeconomic model. We find that digital finance could raise the level of GDP of emerging economies by a total of 6 percent, or $3.7 trillion, by 2025 (Exhibit E6). Achieving this would require all emerging economies to meet two ambitious, but achievable, goals, based on the historical experience of some advanced economies. First, they would need to increase digital payments over the next ten years at the same rate that the top quartile of developed countries achieved over the long term. Depending on where a country starts, this means that digital payments would grow to between 25 and 50 percent of total transactions by volume. Reaching this goal would put emerging economies well within reach of the second goal: ensuring that at least 91 percent of adults gain access to financial services, the average of high-income countries.

Exhibit E6

Digital financial services could boost the GDP of emerging economies by $3.7 trillion—or 6 percent above baseline projected GDP



1 Based on average GDP growth forecast of emerging countries from IHS and Oxford Economics.
NOTE: Numbers may not sum due to rounding.

SOURCE: IHS; Oxford Economics; McKinsey Global Institute analysis

[16] This analysis is based only on current tax receipts that are lost to corruption. It does not consider the additional taxes that could be collected by reducing tax evasion in the informal economy, although that impact could also be very large if digital payments were combined with increased tax enforcement.

Nearly two-thirds of the additional GDP would likely come from improved productivity enabled by digital payments. Businesses, financial-services providers, and government organizations all reap large efficiency gains in the shift from cash to digital payments and from paper to electronic record keeping. This results in less time spent performing manual processes and traveling to and from bank branches. Governments obtain further productivity gains by reducing leakage in their spending and tax collection. One-third of the GDP estimate would come from increased investment as individuals and businesses are brought into the formal financial system, shifting informal savings into digital accounts and unlocking more credit that can be used for investment in businesses and durable goods. The remainder of the GDP impact would come from individual time savings that enable additional hours of work.

The potential impact on GDP for each country depends on its starting point. Lower-income countries such as Ethiopia, India, and Nigeria have the largest potential, given their low levels of financial inclusion and digital payments today (Exhibit E7). Pakistan currently has a less developed financial system requiring greater upfront investment, and thus would not have as large an increase in productivity as some of its lower-income peers. Middle-income countries such as Brazil, China, and Mexico can potentially boost GDP by more modest—but still substantial—amounts, reflecting their higher levels of financial inclusion and digital payments. China, at 4.2 percent, has the lowest additional GDP potential of our seven countries because its debt levels are relatively high today and it has less room to grow credit further in a sustainable manner.[17]

Based on the historical relationship between GDP growth and job creation, we calculate that the additional GDP gains from digital finance would expand aggregate demand and create nearly 95 million new jobs across sectors, a 3.5 percent increase from current levels. Two-thirds of these new jobs are likely to be full-time salaried or wage-paying positions that are in short supply in the developing world.

The economic gains from digital finance are likely to be far larger than the estimates we provide here, because we have not attempted to quantify the impact of many important dynamics. One is the potential impact on growth from raising the quality of human capital in the economy. As more women gain access to financial accounts, they have been shown to spend more on nutrition, education and health care. In addition, regularly paying wages of teachers and health-care workers digitally reduces absenteeism. In India, for example, one study found that attendance rate of teachers is 90 percent in states with reliable digital salary payments, but only 60 to 80 percent in other states.[18] Fewer missed days of work improves the quality of education and health care, enhancing human capital. Second, digital payments can help governments improve targeting of services and subsidies to the poor, and therefore better meet social needs. Third, digital payments create transparency about who is evading taxes. If accompanied by stronger government enforcement efforts, this can reduce the size of the informal economy and boost overall productivity. Fourth, digital payments have already shown their potential to unlock a wide range of new business models in finance and beyond, including e-commerce and on-demand services. Taken as a whole, digital finance can accelerate progress toward meeting many of the UN's Sustainable Development Goals, leading to important societal benefits.[19]

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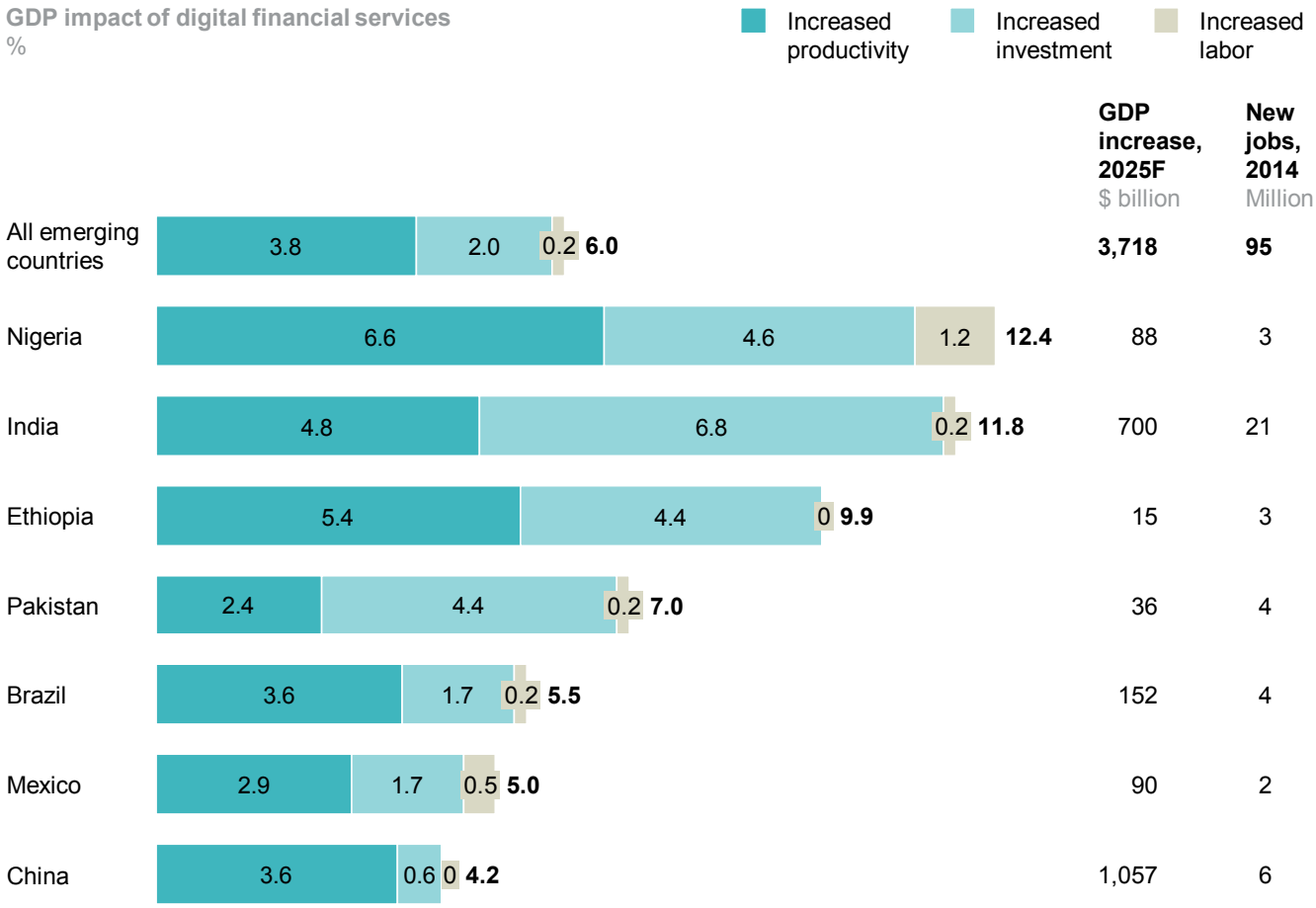
17 *Debt and (not much) deleveraging*, McKinsey Global Institute, February 2015.

18 *Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, October 2010.

19 For example, one of the Sustainable Development Goals is reducing hunger. Digital finance contributes to this goal by giving farmers financial tools to cope with income variations and smooth consumption between harvests. Another example is the climate change and clean energy goal. Digital payments make it possible for households to use pay-as-you-go methods for solar panels and other clean technologies.

Exhibit E7

GDP impact of digital financial services varies significantly across the seven focus countries



NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

THREE BUILDING BLOCKS ARE ESSENTIAL FOR CAPTURING THE BENEFITS OF DIGITAL FINANCE

To capture the potential value of digital finance, three building blocks need to be in place: widespread digital infrastructure, dynamic and sustainable financial-services markets, and products that people prefer to existing, often informal, alternatives. Addressing all three can enable broad—and rapid—adoption of digital finance by the majority of individuals and businesses in emerging economies.

Building a robust and broad digital infrastructure

The infrastructure needed to provide digital finance can either piggyback on existing stock or can be implemented at less cost and more quickly than other types of infrastructure, such as power or transportation. Three primary components are vital.

First is the establishment of widespread mobile connectivity and ownership. To open up broad access to a wide range of financial services, everyone—rich and poor—must own a mobile phone and have access to affordable data plans. Across emerging economies, network coverage, phone subscriptions, and smartphone ownership are either already high or growing fast. However governments, non-governmental organizations (NGOs), and the private sector may need to intervene in rural areas and other "edges" of the network where markets are not delivering due to low returns.

90%
teacher attendance in Indian states with reliable digital salary payments
vs.
60–80%
in other states

A national digital-payment infrastructure is the second essential element. A robust payments "backbone" should support safe, low-cost transactions between any two parties while accommodating innovation by providers. This must be supported by wide networks of cash-in, cash-out (CICO) points—often simple agent networks—to allow people access to cash when they need it, and by a broad set of merchants and businesses that accept digital payments. Most emerging economies lag behind advanced economies in their payment systems infrastructure, although some are taking the lead. For example, Jordan and Peru are leading the way in building payments architecture that is faster and less costly than many payment systems in advanced economies today.[20]

The third necessary component is the existence of a well-disseminated personal ID system. Individuals need some form of ID that financial-services providers can easily verify. Yet one in five individuals in emerging economies remains unregistered, compared with one in ten in advanced economies. IDs need to have easily fulfilled application requirements, a far-reaching physical registration network, and low prices for registration and issuance. National digital IDs with chips or biometric identification, such as those in India or Estonia, are one way to close this gap. Voter ID cards, passports, and driver licenses are other options.

1 IN 5
people in emerging economies unregistered vs.
1 IN 10
in advanced economies

Ensuring dynamic and sustainable financial-services markets

Once a digital infrastructure is in place, it needs to be supported by a sustainable business environment that includes banks and other financial institutions, and also telecoms companies, handset manufacturers, fintech companies, and other businesses such as retailers.

One requirement is risk-proportionate financial-services regulation. Financial regulation needs to strike a careful balance between protecting investors, consumers, and governments; avoiding costly and disruptive banking crises; and giving financial-services providers space to innovate and compete. Prudential regulation should ensure that providers remain healthy and hold enough capital to avoid losses from over-exuberant lending or operational issues such as fraud, cyber risk, and other systemic information technology (IT) failures. Protection of consumers is also needed, particularly those who are most vulnerable and least economically valuable to the provider. Regulation should also support other financial or policy aims—anti-money laundering is an example—by using risk-proportionate measures such as tiered know-your-customer (KYC) stipulations.[21]

Beyond issues of regulation, countries also need to create an environment that is conducive to competition and encourages providers to offer a broad range of new products and financial services. Among the elements needed to stimulate innovation are a competitive market structure, business-friendly regulation for new entrants, financial markets open to foreign investment and talent, and financial capital available for innovation. In some countries, incumbents may seek to shut out new players or tilt the playing field to their own advantage.

Offering financial products people prefer to existing alternatives

People will adopt digital financial services only if they prefer them to existing alternatives, or have incentives to do so. Today, individuals and small businesses use cash and a variety of informal financial arrangements for good reason, and these mechanisms sometimes play a cultural and social role in addition to a financial one. For instance, purchases of gold in India may be a cultural preference, while rotating savings clubs in Nigeria have an important social component. New digital products need to offer true advantage on cost and utility for people

[20] *The Level One project guide: Designing a new system for financial inclusion*, Bill and Melinda Gates Foundation, April 2015.

[21] David S. Evans and Alexis Pirchio, *An empirical examination of why mobile money schemes ignite in some developing countries but flounder in most*, University of Chicago Coase-Sandor Institute for Law and Economics Research, paper number 723, March 2015.

to use them. This will require smart product design and may require well-tuned incentives. Strong, trusted brands should be encouraged to launch affordable, easy-to-use products that are significantly more attractive than current options and require minimal behavioral change by customers. Governments may need to step in with incentives or other measures to promote adoption in the early stages of market development.

While this point may seem obvious, it is a common area of failure in developing and developed markets alike. For example, Pakistan has solid digital infrastructure and financial regulation in place and has even had some success in digital domestic-remittance payments. Nonetheless, the uptake and use of mobile-money accounts is by little more than 1 percent of the adult population; although it is easy to open a digital wallet, people seem to prefer using cash and standard remittance services. In such cases, governments may be able to help by identifying market failures and working with providers to create incentives to use new digital finance products. For example, they might transfer social subsidies and other government payments to individuals digitally, a strategy India is pursuing.

375K
homes in East Africa have solar electricity using mobile money

THE NEXT HORIZON: DIGITAL FINANCE UNLOCKS NEW BUSINESS MODELS

In the long term, the benefits of digital finance go far beyond expanding access, driving down costs, and increasing the convenience of transactions. Like electricity or roads, a digital-payment network is part of the basic infrastructure of an economy that enables individuals and businesses to transact with one another seamlessly. It also can underpin a broader and more innovative array of business activities. Assessing the full range of new business models that could emerge is beyond the scope of this research. But at least three types of new business innovations are already apparent and could further transform the lives of individuals in, and economic prospects of, emerging economies.

First, the increased transparency and information about users generated by digital payments can spawn new types of financial services. New credit-scoring models that assess user data can help lenders assess the credit risk of a broader set of customers. Peer-to-peer (P2P) lending platforms can also emerge. Kubo.financiero in Mexico matches middle class and wealthier savers with small businesses and households looking for credit. Borrowers submit requests that are automatically risk-assessed along with their profiles, and lenders can select the borrowers they want to fund. Text messages prompt borrowers when they miss a payment, and delinquency rates have been lower than at MFIs to date—providing lenders with double-digit returns. Other new apps and digital tools can help businesses analyze their digital sales to improve operations and gain access to cash-advance facilities.

Second, digital payments allow people to transact in small amounts. This creates new business opportunities based on so-called micro-payments. Examples already in existence include pay-as-you-go solar power for households, irrigation systems purchased on layaway plans, and school tuition fees broken into small, frequent payments. In Kenya, M-Kopa Solar utilizes a pay-as-you-go model with payment made over the M-Pesa mobile-money platform; through this, 375,000 homes across East Africa now have solar electricity, and they will save an estimated $280 million over the next four years on their utility bills.

Over the longer term, digital payments can enable development of e-commerce and on-demand services. Today, most e-commerce in emerging economies relies on cash payment on delivery. But digital payments can unleash more rapid growth, given their greater convenience. In turn, e-commerce can unlock consumer spending, particularly in areas where retail options are limited.[22] On-demand services can enable individuals to tap directly into the labor market to find out where their services are most valued: services

[22] *China's e-tail revolution: Online shopping as a catalyst for growth*, McKinsey Global Institute, March 2013.

including everything from driving taxis to day labor to specialized work in technology.[23] As the global digital economy grows rapidly, digital payments provide a more convenient, low-cost way for individuals and businesses to take advantage of new opportunities. The spur to innovation that digital finance can give is one argument among many for adopting it, and its rapid adoption. Examples are mounting of the countries that have benefited from harnessing digital finance. As a developmental tool, it seems indispensable, a means to securing many ends from reducing poverty and hunger, to improving health, creating good jobs and inclusive economic growth, and reducing inequalities. Digital finance is not a miracle cure for all the world's ills, but it is within reach, and available now to emerging economies willing and ready to seize its many benefits.

•••

Economic development is usually a long journey, but digital finance solutions can radically speed the progress, and at a relatively affordable cost. Imagine the person in a rural area winning back the time spent traveling many miles on foot or by bus to a cash agent, and being able to work instead. Think of how many more small businesses might expand if they had access to credit. Picture the smallholder farmers who can finally get loans to buy the seeds, fertilizer, and farming tools needed to improve crop yields and boost incomes. And imagine, too, the enormous new business opportunities for banks, telecoms companies, fintech players, retailers, or any company that harnesses the low costs of transacting digitally to serve a much broader customer base of individuals and businesses profitably. Digitizing finance will be a multiyear effort for many countries but the sooner they start, the faster the rewards will come, in the form of higher growth, greater innovation, and more inclusion. The good news is that the digital infrastructure needed already exists and is being further improved. Billions of people across emerging economies possess the mobile handset that can connect directly into the national payments system. They are just waiting for governments and businesses to wire up the infrastructure and create the products they need.

[23] *A labor market that works: Connecting talent with opportunity in a digital age*, McKinsey Global Institute, June 2015.

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1. THE LIMITED SCOPE OF FINANCE IN EMERGING ECONOMIES TODAY

A well-functioning financial-services sector is critical to the economic health of a country, allowing people to save for and insure against expected and unexpected events, enabling entrepreneurs and businesses to invest in new and productive businesses and to manage their supply chains, and making it possible for individuals, businesses, governments, and financial-services providers to conduct transactions efficiently.

However, individuals and businesses in emerging economies do not have the same access to financial services enjoyed by their counterparts in advanced economies. Two billion people, or 45 percent of the developing world's adult population, lack an account with a bank, other financial institution, or mobile-money service. In addition, 200 million MSMEs, or half of all such businesses in emerging economies, lack sufficient access to the credit they need to thrive.[24]

The problem of financial exclusion goes far beyond the poor—the majority of the developing world's consuming or middle class are also underserved. Those who do use financial services face significant inefficiencies, leading to high prices and limiting their access to the broad range of savings, credit, and insurance products that is commonplace in advanced economies. Where good formal options do not exist, individuals and businesses must resort to cash and the informal financial system with high costs and greater risks—both to themselves and to society at large—or forgo business opportunities entirely.

Financial institutions and governments also lose. Heavy use of cash—93 percent of all transactions across emerging economies are conducted in cash compared with 50 percent in developed economies—raises costs for providers and deters them from serving millions of less wealthy customers and smaller companies. For example, more than 99 percent of transactions by volume in Ethiopia, India, Nigeria, and Pakistan are in cash, with buyers using cash for everything from real estate transactions to vehicle registration. Similarly 94 percent of all transactions in China remain in cash.[25] For governments, cash-based payment systems create a leaky pipeline for expenditure and tax collection; in some cases, nearly one-third of such payments can be lost to corruption.[26]

THE FINANCIAL NEEDS OF MOST INDIVIDUALS IN EMERGING ECONOMIES ARE NOT BEING MET

2B
people lack a financial account in emerging economies

A significant share of people in emerging economies are simply not part of the financial system, and an even larger number of adults do not use a full suite of financial services such as investment products, lines of credit, mortgage loans, and insurance. Limitations in financial access are particularly acute among women, people living in rural areas, and those who are less well off. However, even wealthier people in emerging economies transact more in cash, save more in hard assets, and borrow less from formal sources than do their counterparts in advanced economies. Difficult access, limited product choice, and high prices and other intangible costs such as travel time all are to blame. The resulting financial exclusion imposes costs and means that opportunities are lost.

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[24] We drew on a number of sources to arrive at these estimates, including the Global Findex database 2014, World Bank, April 2015; World Development Indicators database, World Bank, 2016, IFC Enterprise Finance Gap database 2011, SME Finance Forum, 2013, and *Closing the credit gap for formal and informal micro, small, and medium enterprises*, International Finance Corporation, October 2013.

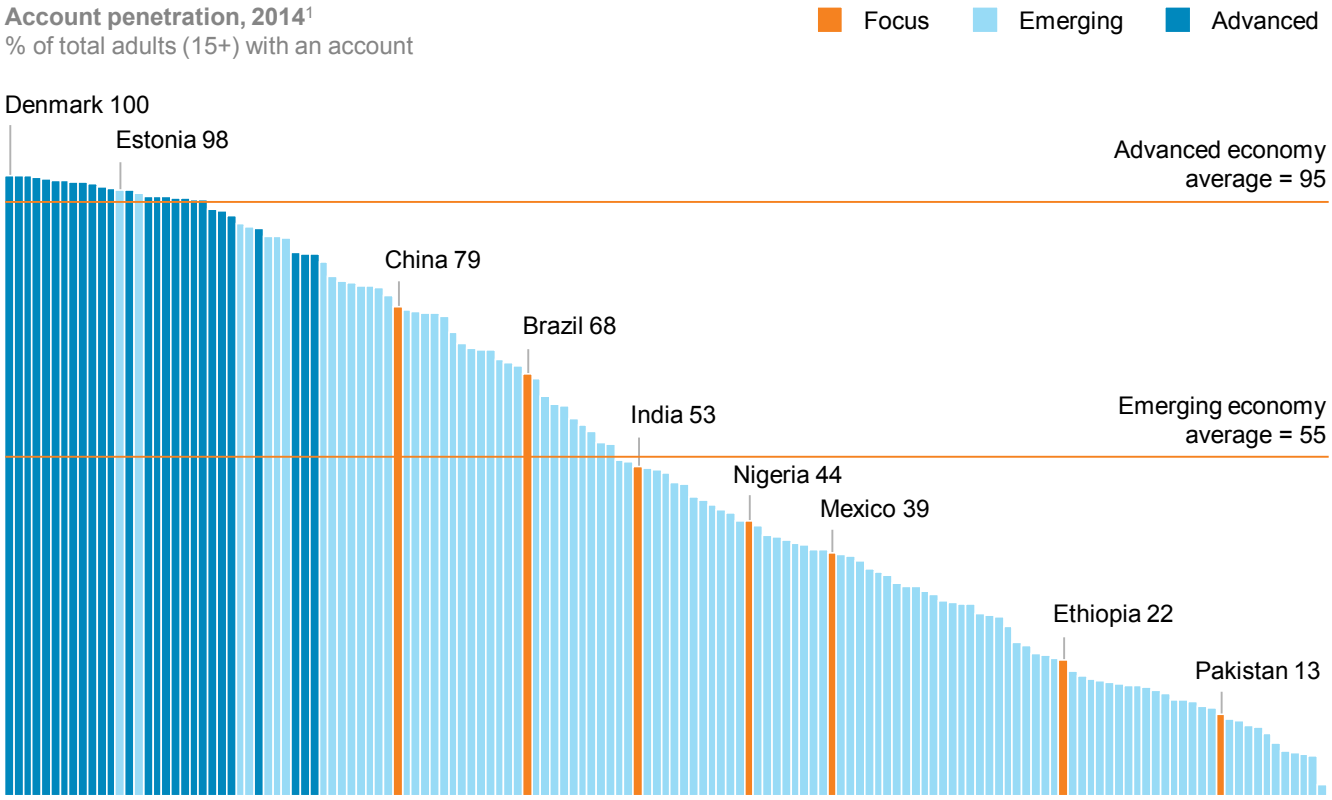
[25] McKinsey Global Payments Map 2016 (2014 data).

[26] *From cash to digital transfers in India: The story so far*, Consultative Group to Assist the Poor, February 2015.

Emerging economies lack broad financial access. Only 5 percent of individuals in advanced economies lack a formal financial account, but across emerging economies the average is a striking 45 percent (Exhibit 1). A majority of adults do not have formal accounts in South and Southeast Asia, the Middle East, and Africa; sub-Saharan Africa, 66 percent of adults do not have formal accounts.[27]

Exhibit 1

Forty-five percent of adults in emerging economies do not have a formal financial account



1 Denotes the percentage of respondents (15+ years in age) who report having an account (by themselves or with someone else) at a bank or another type of financial institution, or through a mobile-money service.

SOURCE: Global Findex database 2014, World Bank; McKinsey Global Institute analysis

In emerging economies as a whole, 60 percent of the richest three quintiles have formal accounts, while only 46 percent of the poorest two quintiles do. There is a similar urban versus rural divide: 61 percent of urban adults have formal accounts compared with only 48 percent of rural adults. While 59 percent of men have access to bank accounts, only 50 percent of women do.[28]

The unbanked are not the only customers underserved by the financial sector. Many more people do not use their bank accounts actively and lack access to appropriate savings, credit, and insurance products. As a result, people in emerging economies rely heavily on cash—only 3 percent of transactions made by individuals are made through digital means.[29] Just 10 percent of individuals in emerging economies borrow money from

27 Sources are the Global Findex database 2014, World Bank, April 2015; World Development Indicators database, World Bank, 2016; and the McKinsey Digital Payments Map.

28 Ibid.

29 Based on weighted average of all digital payment categories for consumer-to-consumer, consumer-to-business, and consumer-to-government transactions. McKinsey Global Payments Map 2016 (2014 data).

financial institutions, and a similar share have a credit card.[30] In Pakistan, which has an adult population of 120 million, formal banks hold only around 70,000 outstanding mortgages. Given the lack of mortgages, credit cards, auto loans, and other forms of financing, it is not surprising that average household debt in emerging economies is just 24 percent of GDP—only one-third the level of advanced economies. Furthermore, the average private-sector (household and non-financial corporate) debt-to-GDP ratio in emerging economies, at 74 percent, is less than half the 181 percent average in developed countries.[31]

Difficult physical access to branches can contribute to the limited scope of finance. People living in rural areas of emerging economies are typically less well off than their urban counterparts and are often physically far removed from bank branches. In Ethiopia, 80 percent of the population lives on rural smallholdings that can be ten kilometers or more from the nearest bank branch or ATM; just 22 percent of all adults have a formal financial account. In India it may take several hours to visit a rural bank branch that is open only on weekdays, forcing people not only to lose time and money on travel but also often requiring them to take a day off of work or keep a child out of school to make a simple deposit or withdrawal. We estimate that Indians lose more than $2 billion a year in forgone income simply because of the time it takes traveling to and from a bank.

Even those living near a branch may be intimidated by bank branches, mistrust formal financial institutions, or simply not feel that they have enough money or sufficiently stable cash flows for an account to be of benefit. Many urban dwellers in India live more than two kilometers from a bank branch; hawkers in Mumbai, for instance, struggle to visit branches because they are open only during peak money-making hours.[32] It is no wonder that because of the time and cost required to interact with a bank, many poor and rural individuals opt instead to use cash for transactions (Exhibit 2).

Women face significant additional hurdles when seeking to access financial services; they account for 55 percent of the world's two billion unbanked. One reason for this is that women often are harder for financial-services providers to reach—on average they are less likely to travel to nearby towns and have less access to digital technologies. At the same time, many financial institutions have not developed as deep an understanding of potential female customers, of whom they have less experience servicing, and may overlook the significant pool of potential customers women represent (see Box 1, "The gender gap in financial inclusion").

In the absence of adequate financial services, unserved and underserved households rely on cash and informal financial services that provide at best partial solutions for their financial needs. Many save cash at home or buy physical assets such as gold and livestock, or belong to informal savings groups, incurring risk and forgoing the opportunity to earn interest and build a credit history. Without access to formal credit, many must borrow from family and friends or illegal lenders, often paying very high interest costs. Without a secure and cost-effective way to save, households are limited in their ability to invest in their future, smooth their income over the year, or manage shocks such as illness or natural disasters.

[30] Sources are the Global Findex database 2014, World Bank, April 2015, and World Development Indicators, World Bank, 2016.

[31] McKinsey Global Institute Country Debt database.

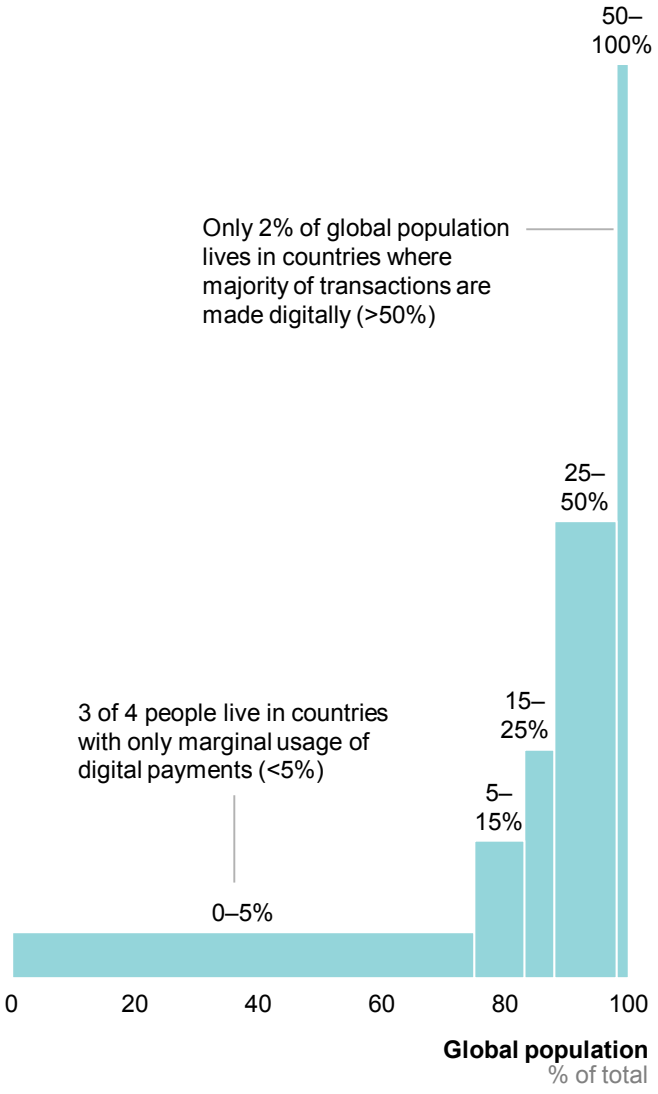
[32] Rupambara, "Financial inclusion of the urban poor: Issues and options," *CAB Calling*, July-September 2007, and "Financial inclusion in urban India," indiamicrofinance.com, July 2014.

Exhibit 2

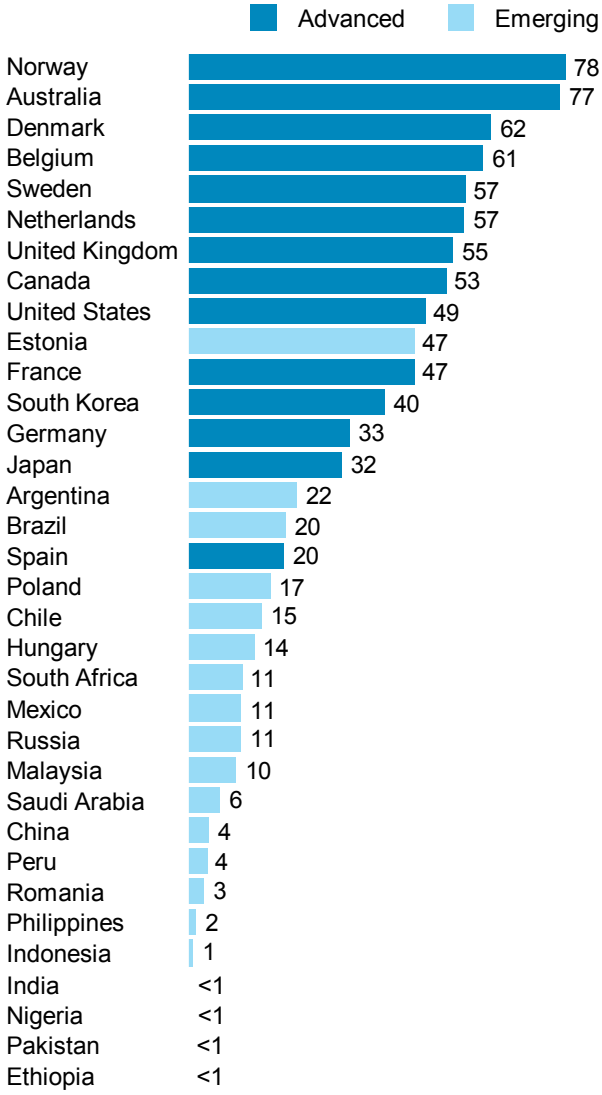
The vast majority of payments in emerging economies use cash, while digital payments are widely used in advanced economies

% of total transactions by volume, 2014

Share of digital payments—global aggregate



Share of digital payments—by country



SOURCE: McKinsey Global Payments Map; World Bank; McKinsey Global Institute analysis

Box 1. The gender gap in financial inclusion

The gender gap in financial inclusion imposes broad costs both on women and on society. Recent MGI research found that advancing gender equality could unlock $12 trillion of incremental GDP by 2025. MGI identified closing the gender gap on financial and digital inclusion as one of four key enablers for making broader progress on gender equality in society and in work (the other three enablers are education, legal protection, and sharing of unpaid care work).[1] A range of empirical studies has also demonstrated that giving women access to financial accounts creates a virtuous cycle of growth, as women are more likely than men to spend their money on products and services that increase the welfare and productivity of the family such as food, health care, and education.[2]

Women in emerging economies are 20 percent less likely to have a formal account than men and have 23 percent less access to a broader set of products including mobile banking and credit. In 34 of 91 countries MGI studied, women face high to extremely high gender inequality on financial inclusion.[3] South Asia, and the Middle East and Africa, fare particularly poorly, with average female access just 64 percent that of men. Women in five countries studied—Chad, Morocco, Niger, Pakistan, and Yemen—have access that is less than 50 percent that of men.

Women's World Banking, a global non-profit working to increase female financial inclusion, finds four structural reasons for this gender gap:[4]

- **Women have fewer controlled assets** because of lower education and employment levels, lower average incomes, and—in certain regions—cultural barriers to inheriting and owning assets.
- **Women are harder to reach** due to their more limited ability to travel to nearby towns to visit branches, and a digital gender gap in access and usage—MGI research shows that women in emerging economies have on average 84 percent of the access that men have to internet and mobile services.[5]
- **Financial institutions are less understood by women** because of their lower education levels and smaller exposure to the financial system.
- **Women are less understood by financial institutions**—many banks are unaware of the unique barriers faced by women and also overlook the significant business opportunity they represent.

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1 *The power of parity: How advancing women's equality can add $12 trillion to global growth*, McKinsey Global Institute, September 2015.

2 Matthias Doepke and Michèle Tertilt, *Does female empowerment promote economic development?* Centre for Economic Policy Research discussion paper number 8441, June 2011.

3 *The power of parity: How advancing women's equality can add $12 trillion to global growth*, McKinsey Global Institute, September 2015.

4 Leora Klapper and Pankhuri Dutt, *Digital financial solutions to advance women's economic participation*, World Bank Development Research Group, Better Than Cash Alliance, Bill and Melinda Gates Foundation, and Women's World Banking, November 2015.

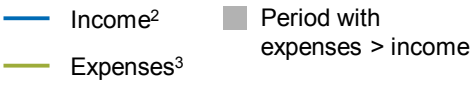
5 *The power of parity: How advancing women's equality can add $12 trillion to global growth*, McKinsey Global Institute, September 2015.

While the poor are most likely to be financially unserved and underserved, the precarious nature of their finances means that, on a relative basis, they often have the most to gain from appropriate financial services. Poor people in emerging economies are overwhelmingly informally employed, with low and irregular income. Social safety nets tend not to protect them well. One study tracking cash flows of poor farming families in Mozambique, Pakistan, and Tanzania shows that their income streams can be highly irregular, with high-income months following harvest generating an average of six times the income of low-income months (Exhibit 3).[33]

Exhibit 3

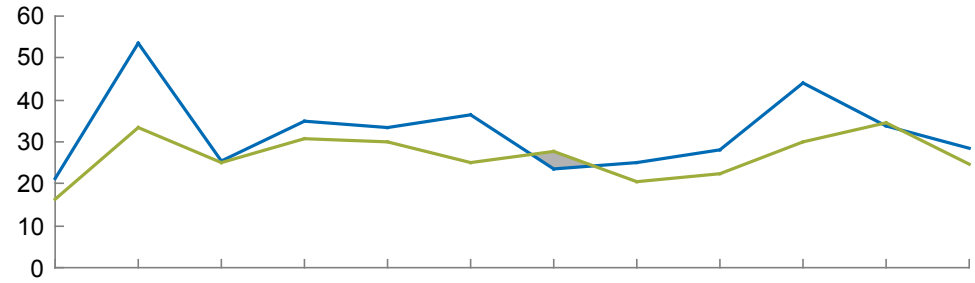
Savings accounts and credit lines can help to smooth income and expenses, which are typically lumpy and not well matched

Average variation in sample household operational income and expenses over one year, 2014–15[1]
$, constant 2014 exchange rate



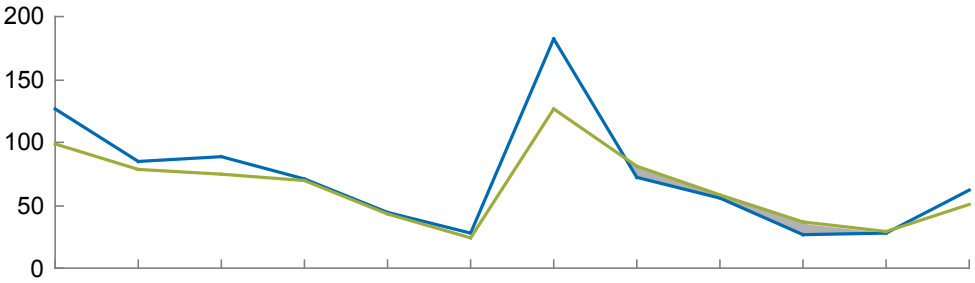
Mozambique

Annual income exceeds annual expenses by $66.60, but with 2 months when expenses are higher



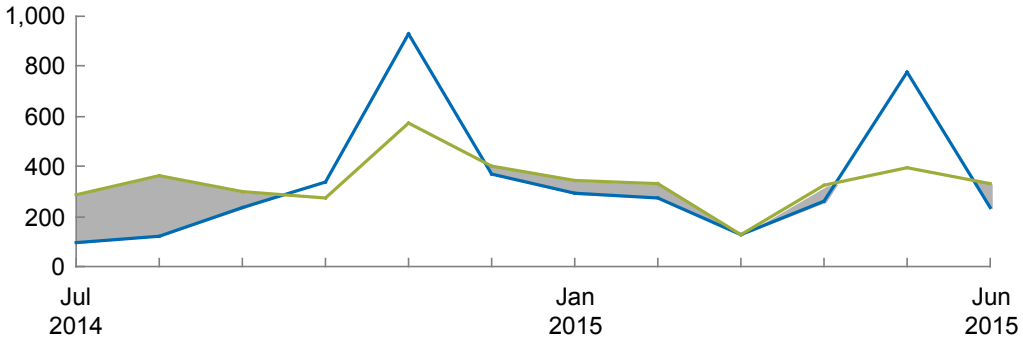
Tanzania

Annual income exceeds annual expenses by $99.40, but with 4 months when expenses are higher



Pakistan

Annual income exceeds annual expenses by $6.30, but with significant month-to-month fluctuation and 8 months when expenses are higher



1 Sample sizes were 93, 88, and 94 households, respectively, across Mozambique, Tanzania, and Pakistan.
2 Operational inflows from employment and resources received from outside the home; excludes sale of physical assets and inflows from financial tools (e.g., repayment of loan given, receipt of loan funds, withdrawal from savings group).
3 Operational outflows from the purchase of consumable goods (e.g., food, clothes, medical care, field labor) and resources given outside the home; excludes the purchase of store-of-value physical assets (e.g., livestock, appliances, building materials) and outflows from financial tools (e.g., repayment of loan received, deposit into savings group).
NOTE: Not to scale.

SOURCE: World Bank, Mozambique, Tanzania, and Pakistan CGAP Financial Diaries with Smallholder Households 2014–2015; McKinsey Global Institute analysis

[33] Jamie Anderson and Wajiha Ahmed, *Financial diaries with smallholder households*, Consultative Group to Assist the Poor, February 2016.

Expenditure is also uneven, with average outflows in high expenditure months four times those in low expenditure months. Critically, the ups and downs of expenditure roughly track those of income—suggesting that people without formal financial tools are forced to match their spending to those times when they have earnings, rather than when they most need to spend. In addition, nearly all poor families save to smooth income, but they have only crude tools to do so. An average of 91 percent of the smallholding households studied kept savings in their homes for at least part of the year, and most also used other informal means such as savings groups and loans to friends and families.[34] Access to formal credit is similarly limited—78 percent of households studied reported that they borrow from friends and family to meet such needs.[35] Appropriate, low-cost financial services could help poor families save during plentiful times and draw down on these savings or access credit during leaner times. These services would also support households at times when they need to make investments, such as planting seasons.

In short, lack of access to financial services is one factor that keeps the poor in poverty, limiting their ability to invest in their farms, businesses, and children. It also hinders the middle class from raising their economic sights and their incomes. Economic growth at the country level suffers as a result.

HALF OF THE MSMES IN EMERGING ECONOMIES LACK ACCESS TO FINANCIAL SERVICES

200M
MSMEs lack access to the credit they need

Financial exclusion affects business in emerging economies as well as individuals. MSMEs around the world lack access to financial services, but the problem is particularly acute in emerging economies. Today, 200 million MSMEs in emerging economies, or half of all such businesses, lack access to a bank account, and a similar number lack access to the credit that they need to thrive (Exhibit 4).

The credit gap—the gap between credit that MSMEs in emerging economies currently can obtain and what they need—amounts to an estimated $2.2 trillion. This gap is found in businesses of all sizes, and derives roughly similar amounts from four categories of MSMEs—formal medium-sized businesses (50 to 250 employees), formal small businesses (five to 49 employees), formal micro businesses (less than five employees), and informal businesses of all sizes. This gap is present across all emerging economies. In China, for instance, an estimated 51 million unserved and underserved enterprises have a combined credit gap of $338 billion; in Brazil, eight million unserved and underserved enterprises have an estimated credit gap of $237 billion; and in India, the equivalent figures are 23 million enterprises and a $140 billion gap.[36]

Cash transactions impose significant complexity and costs on businesses in emerging economies. They must maintain the right level of cash inventory amid daily, weekly, monthly, and seasonal variations in revenue and expenses. Cash must be kept secure from theft, including employee theft, which places additional constraints on the ability of owner-run businesses to expand beyond locations that can be managed by immediate family. Managing in cash also hinders a business's ability to build a digital trail to demonstrate creditworthiness, which would help them obtain loans to fund working capital or invest in expansion.

When MSMEs can access loans today, they typically face very high interest rates and collateral requirements. World Bank Enterprise Surveys show that collateral required averages 50 percent of the loan value in advanced economies but 124 percent in

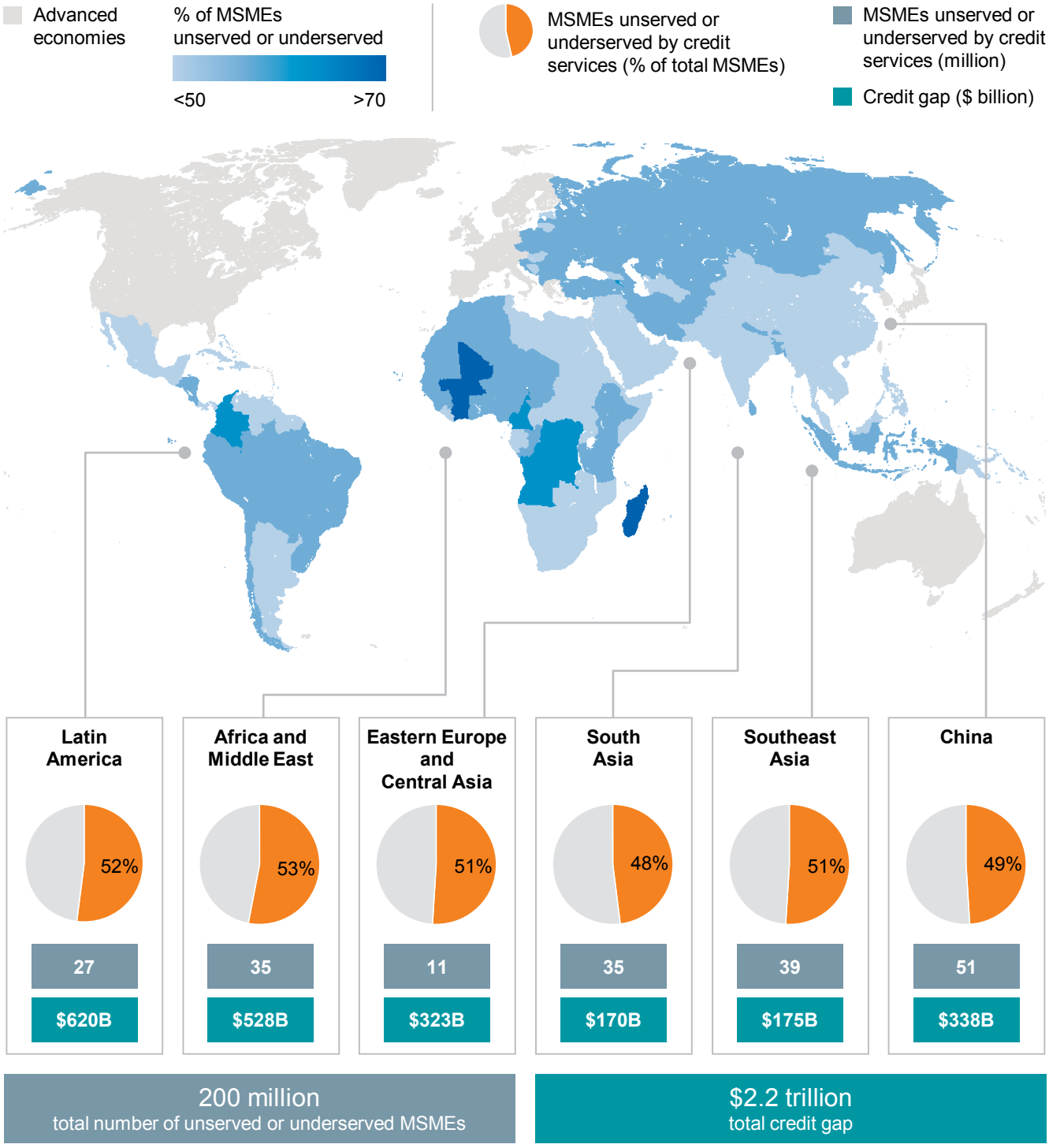
[34] Ibid.
[35] Ibid.
[36] IFC Enterprise Finance Gap database 2011, SME Finance Forum, 2013.

emerging economies—and 157 percent in sub-Saharan Africa.[37] Similarly, the interest rate spread—the difference between lending and deposit rates—averages three percentage points in advanced economies, but eight percentage points in emerging economies and 12 percentage points in sub-Saharan Africa.[38]

Exhibit 4

Micro, small and medium-sized enterprises across developing regions cannot access the credit they need to grow

2013



SOURCE: SME Finance Forum; McKinsey Global Institute analysis

[37] Era Dabla-Norris et al., *Distinguishing constraints on financial inclusion and their impact on GDP, TFP, and inequality*, NBER working paper number 20821, January 2015.

[38] Ibid.

While MFIs have emerged over the past 40 years to provide much-needed financial services to poor households and microenterprises, these institutions have faced the same cost constraints as traditional brick-and-mortar banks. Many leading MFIs are now looking to digital to transform their interaction with customers and also the cost base for delivering products and services (see Box 2, "MFIs have played a role in filling the gap").

Box 2. MFIs have played a role in filling the gap

A range of MFIs has stepped in over the past four decades to fill the void in financial services for poor people and microenterprises. Collectively, they served 211 million borrowers at the end of 2013.[1] Their success has been built on tailoring their products, underwriting methods, and outreach to local conditions in poor countries, often in rural areas. These institutions have proven that people at the bottom of the pyramid need access to credit and savings—and that they will repay loans.

Nonetheless, most MFIs today face many of the same constraints as brick-and-mortar traditional banks. By relying primarily on manual processes and cash, high transaction costs limit their ability to achieve greater scale. Their often narrow focus on poor customers means that they do not capture the economies of scale and the network effects that they could if they offered a broader set of products. Today, many MFIs are focusing on the digital solutions we discuss in Chapter 2.

To understand the position of MFIs today, it is worth tracing their evolution. The modern microfinance movement began in the 1970s when Accion in Brazil and Grameen Bank and BRAC in Bangladesh began experimenting with new models of lending to the poor. For example, Grameen Bank started by lending to groups of women, with the credit access of the group based on the repayment behavior of each member. Microcredit expanded steadily in the 1980s and 1990s, reaching an estimated 31 million borrowers worldwide by 2000.[2]

Microcredit then entered a period of rapid growth. Attention on the sector increased in 2006 when Grameen Bank and its founder Mohammad Yunus were awarded the Nobel Peace Prize. The sector also attracted an increasing number of for-profit lenders and yield-chasing capital, attracted by the opportunity to charge high interest rates.[3]

However, rapid growth led to a crisis for the sector. An increasing number of customers held multiple loans or took out new loans to repay old ones. To add to these challenges, randomized control trials on microcredit were coming to light, showing that its impact on poverty reduction was more mixed than proponents had claimed.[4] In India, in 2010, the press linked the aggressive sales and collection practices by some for-profit lenders to numerous suicides in some regions, causing a scandal, changes in government policy, and a subsequent collapse in repayments in affected regions.

Reform efforts by these institutions over the past five years have resulted in a stronger and more mature sector. MFIs have diversified into savings and insurance products, for the benefit of their customers and their own balance sheets. Lending has returned to growth. Additional randomized control trials have led to a more consistent view in academic literature that microcredit has a positive impact on the welfare of poor households. The sector continues to focus on improving scale and reducing costs—though expense ratios have remained high at 15 percent of MFIs' loan balances in 2011.[5] To that end, the sector is looking to digital finance to help lower costs further and reach a greater share of the world's poor people. In certain countries, where MFIs have strong, trusted brands and unique insights into the needs of underserved customers, MFIs are well positioned to emerge as part of the mix of new players in digital finance.

1 *The state of the microcredit summit campaign 2015: Mapping pathways out of poverty*, Microcredit Summit Campaign, December 2015.

2 Ibid.

3 Ibid.

4 Abhijit Banerjee and Esther Duflo, *Poor economics: A radical rethinking of the way to fight global poverty*, Public Affairs, 2011; also Dean Karlan and Jacob Appel, *More than good intentions: How a new economics is helping to solve global poverty*, Dutton Penguin, 2011.

5 Richard Rosenberg et al., *Microcredit interest rates and their determinants: 2004–2011*, Consultative Group to Assist the Poor, Microfinance Information Exchange (MIX), and KfW banking group, June 2013.

FINANCE PROVIDERS ARE MISSING OUT ON A LARGE MARKET OPPORTUNITY

Value of financial assets averages

149%

of GDP in emerging economies (excluding China) vs.

446%

in developed countries

Outmoded financial systems mean that banks and other financial institutions in emerging economies are designed primarily to serve better-off individuals, large businesses, and government agencies that deal in large sums. This is a lost opportunity for financial-services institutions, and it traps both providers and their customers in a self-perpetuating bind. The high costs incurred in branch interactions and the lack of modern digitized systems limit the ability of banks to broaden their pool of customers and assess the creditworthiness of potential new borrowers. As a result, banks are left dependent on a relatively small customer base, in particular for loans—banks often fail to find enough qualified borrowers. Loan-to-deposit ratios in emerging economies, which average just 62 percent, remain consistently below regulatory limits and advanced economies averages. This is a cruel irony in countries where businesses lack credit to expand operations and where households lack means to invest in ways to improve their livelihoods.

The level of depth and development of financial systems in emerging economies remains very low. We find that the total value of financial assets—including all loans, bonds, and equities—is 326 percent of GDP in China and 149 percent of GDP in all other emerging economies, compared with 446 percent of GDP in developed countries (Exhibit 5).[39] This reflects the limited size of the banking system and the underdevelopment of capital markets, reducing liquidity and limiting much-needed investment in these economies.

GOVERNMENTS EXPERIENCE WASTE IN SPENDING, LOSE REVENUE, AND ARE LESS EFFECTIVE BECAUSE OF CASH-BASED PAYMENTS

Up to

1/3

of direct subsidies paid in cash can be lost to corruption

Governments in cash-driven economies lose twice. Spending does not reach its intended recipients in full, and revenue is lost from leakage by tax collectors and tax evasion. Take spending. First, direct subsidies delivered in cash are subject to significant leakage—in some cases, up to one-third of such payments can be lost to corruption.[40] Second, direct subsidies of goods such as fuel and staple foods, a popular form of social welfare in cash-driven economies, are prone to fraud and induce significant market distortions. Consider the experience in India, where subsidies on liquefied petroleum gas had cost the government up to $8 billion per year and created a black market from resold canisters, many initially claimed by "ghost" recipients. Using these programs, governments forgo the ability to price fuels in a way that accounts for their costs on society and to encourage investment in energy efficiency. The IMF estimates that pricing energy fairly across all countries could raise government revenues by $2.9 trillion, or 3.6 percent of global GDP, cut global carbon dioxide emissions by 20 percent, and reduce premature deaths attributed to air pollution by 55 percent.[41] Subsidies are also difficult to target to those in need. Across the developing world, the IMF estimates that 43 percent of the benefit of fuel subsidies went to the wealthiest quintile, because of their relatively higher consumption, while only 7 percent of the benefit went to the poorest quintile.[42]

On the revenue side, cash-based revenue collection is complex and expensive, and it requires significant physical infrastructure and administrative effort. This complexity introduces multiple opportunities for fraud and theft, in particular where manual processes and record keeping are used. McKinsey research on revenue collection in the Indian post system estimated a leakage rate of 2 percent for revenue collected this way—a total cost of $700 million in 2008.[43]

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39 McKinsey Global Institute Financial Assets database.

40 *From cash to digital transfers in India: The story so far*, Consultative Group to Assist the Poor, February 2015.

41 David Coady et al., *How large are global energy subsidies?* IMF working paper number 15/105, May 2015.

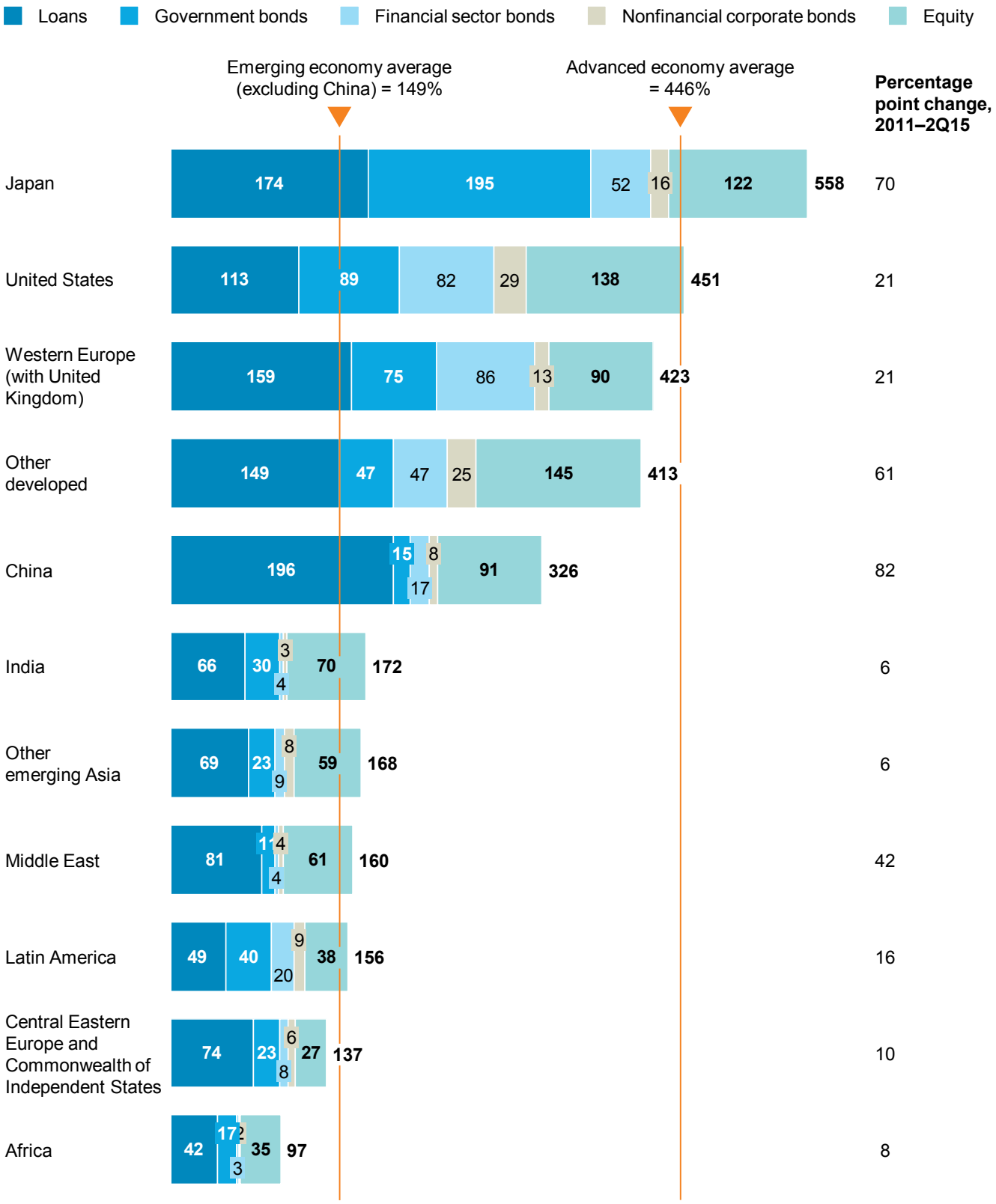
42 Ibid.

43 *Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, October 2010.

Exhibit 5

The average financial depth in advanced economies is three times the level in emerging nations, with the exception of China

Financial depth by region and asset class, 2Q15[1]
% of GDP



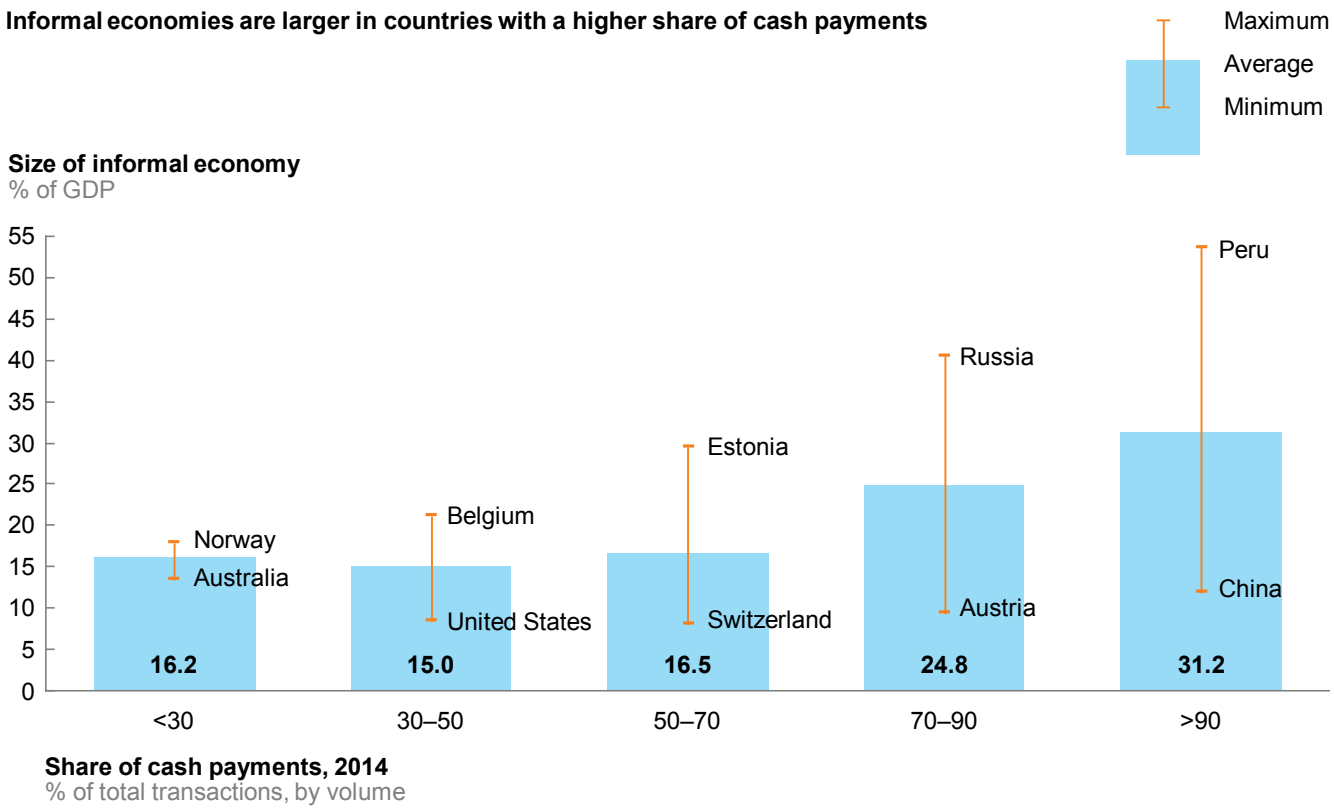
1 Calculated as total regional debt and equity outstanding divided by regional GDP.
NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute Financial Assets database; McKinsey Global Institute analysis

The predominance of cash transactions in emerging economies also spawns a large informal economy of businesses that do not register their entities, pay taxes, or comply with other product-market and labor-market regulations. This deprives governments of tax revenue and also has wider consequences for the economy. Many complex factors drive the size of a country's informal economy, including the competitiveness of its tax regime and the degree of tax enforcement. However, across countries there is a strong correlation between use of cash and size of the informal economy (Exhibit 6).

Exhibit 6

Informal economies are larger in countries with a higher share of cash payments



SOURCE: McKinsey Global Payments Map; World Bank; Friedrich Schneider's research on informal economy; McKinsey Global Institute analysis

From an economic perspective, the informal economy imposes a high cost and significantly hinders growth. Many developing countries have a two-speed economy: a modern sector of healthy companies with high productivity (or output per unit of input), and an informal sector of subscale firms that drags down overall productivity and growth. Informal firms face perverse incentives and may avoid investments or growth that could increase their visibility to regulators and tax authorities. In Turkey, for instance, MGI has found that the productivity of formal companies is 2.5 times that of informal firms. The gap in productivity levels between formal and informal firms is similar in Brazil, India, Mexico, Russia, and elsewhere.[44]

The presence of informal firms also harms the economy by limiting the ability of high-productivity, modern firms to gain market share, given the significant cost advantage informal firms enjoy by not paying taxes. MGI research has found that the cost advantage from tax avoidance ranges from 5 percent of the cost of goods sold in Mexico food retail to 25 percent in India's apparel sector and to more than 100 percent in the case of Russian software. Formal companies also face additional costs and complexity in managing informal firms with outmoded technology in their supply chain.[45] This dampens the healthy

[44] Diana Farrell, "The hidden dangers of the informal economy," *McKinsey Quarterly*, July 2004.
[45] Ibid.

process of "creative destruction" in the economy in which the most productive companies take market share from less productive ones. In Brazil, MGI has estimated that informality explains about one-third of Brazil's productivity gap with the United States.[46] In Mexico, MGI has found that the productivity of informal firms is declining, significantly dampening the country's overall GDP growth.[47]

•••

The economic prospects of emerging economies would be far brighter if more individuals, businesses, and even governments had access to modern financial services. For now, billions of women and men and hundreds of millions of businesses, small and large, are trapped in a cash economy. But a rescuer is at hand: digital technology, in the shape of a mobile phone. If digital's power is harnessed in finance as it increasingly is in other types of economic activity, this could prove transformative for emerging economies. The technology exists and is now widespread. The opportunity is waiting to be seized. In Chapter 2, we describe how digital services can transform finance, and what that would mean for people and businesses across the developing world.

[46] *How Brazil can grow*, McKinsey Global Institute, December 2006.

[47] *A tale of two Mexicos: Growth and prosperity in a two-speed economy*, McKinsey Global Institute, March 2014.

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2. THE POWER OF DIGITAL TO TRANSFORM FINANCE

Digital technologies are spreading around the world at extraordinary speed, disrupting sectors and transforming many facets of everyday life, from how we communicate with family and friends, to how we read our news, and find a job. In emerging economies, the next frontier is finance.

Digital technologies promise to transform finance in three foundational ways. First, digital-finance solutions can expand customers' access and the reach of providers. A growing majority of people in emerging economies now own a mobile phone, which can give them ready access to financial services. In Kenya, for example, nearly 70 percent of the adult population now use a mobile-money account that they can access with either simple 2G phones or smartphones; in Tanzania and Uganda the figure is around one-third of the adult population. Expanded reach also offers a potential boon to providers and a new way for governments to pay and be paid by citizens. Second, digital technologies can lower the cost of providing financial services by 80 to 90 percent, transforming the economics for providers and making it profitable for the first time to serve poorer and more remote consumers. Under most market conditions, lower costs translate into lower prices, and users—both individuals and businesses—stand to gain. Finally, digital enables new business models, offering expanded services to customers and potential new revenue streams to providers. These benefits mesh to form a virtuous cycle.

Every step toward full digitization of financial services helps reduce costs, making it profitable for providers to serve a much larger range of customers. As the network of digital-payment users grows, economies of scale drive down costs, and even more people are able to join. These powerful network effects are an opportunity and a challenge—an opportunity because once there are sufficient people active in a financial system, they drive accelerating growth; a challenge because providers need to create a broad spectrum of products to get customers to use them actively.

Nearly
70%
of adult Kenyans use a mobile-money account

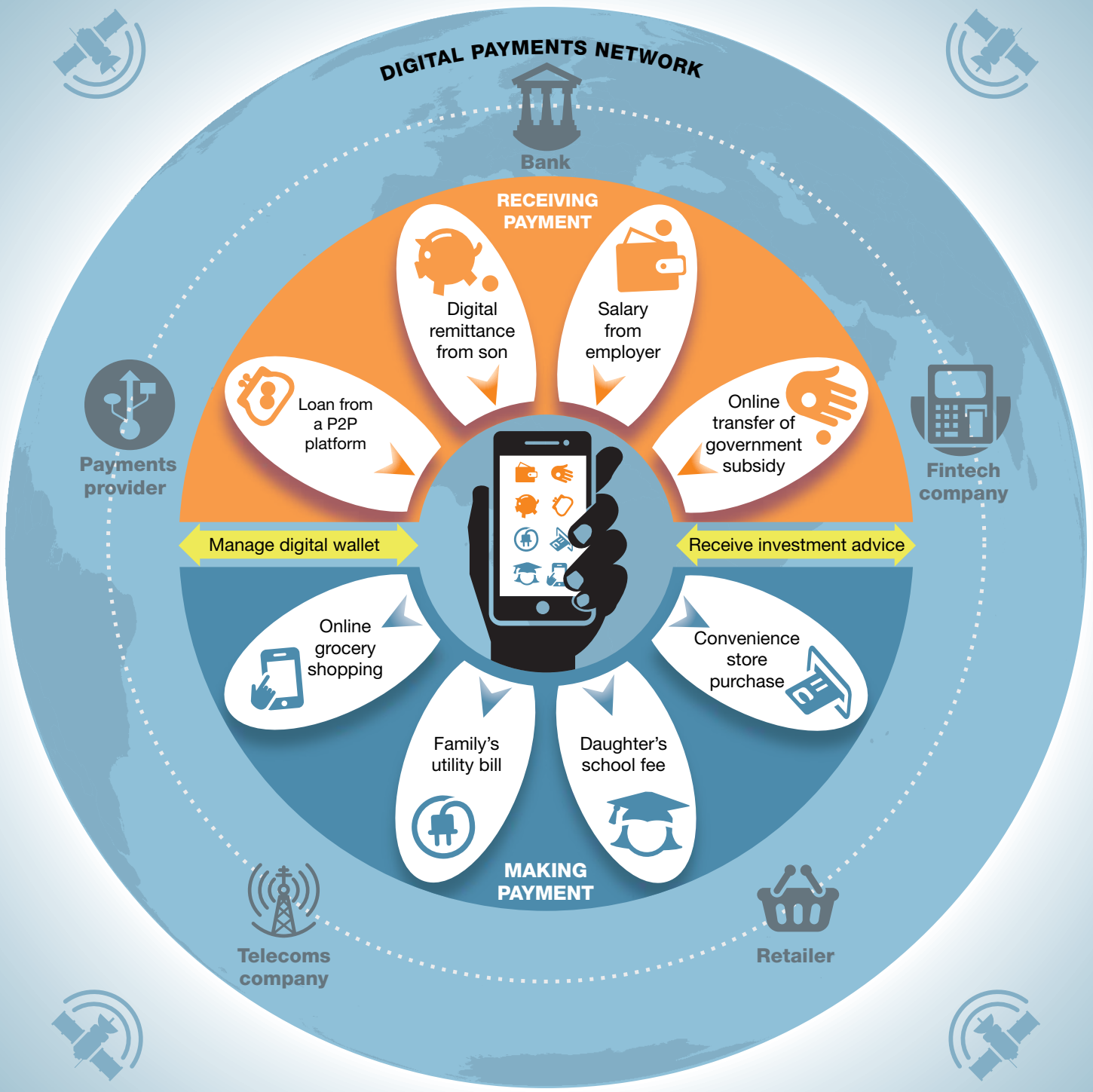
WHAT DOES DIGITAL FINANCE LOOK LIKE IN PRACTICE?

For many people, the story begins with the mobile phone in the palm of their hand. A mobile handset can provide easy access to a digital wallet that could be used to receive or make payments, to save money, and to provide access to a broader range of financial services. Digital wallets may be provided by banks, telecoms companies, or fintech companies, depending on the conditions and the regulations of the country. The same sorts of companies will offer financial services beyond payments, perhaps with regulation permitting only banks to undertake more complex or customer-facing types of financial activity. Payment networks, also operating digitally, connect the system together, so that anyone can pay or be paid by anyone. These include automated clearinghouses, systems for clearing large transactions between financial institutions, and card networks such as Visa, MasterCard, and China UnionPay. Telecom companies or other internet service providers arrange the underlying connectivity to anyone, anywhere.

In the ideal digital-payment system of the future, there will be significantly less use of cash and paper records, and many fewer brick-and-mortar bank branches. With digital accounts that can be accessed on the internet through a mobile phone or other device, individuals will receive remittances, wages, and government subsidies, and can, in turn, make payments to stores, utilities, schools, and other vendors from any location. Retailers will accept payment digitally, and businesses' supply chain payments will occur through bits and bytes (Exhibit 7).

Exhibit 7

Digital finance: Transforming how people transact



SOURCE: McKinsey Global Institute analysis

Achieving this digital future will be a journey. In the more immediate term, digital finance will coexist with cash and with the use of physical credit, debit, and prepaid cards. Even in Norway, which has the world's highest share of digital payments, 22 percent of transactions are still conducted in cash.[48] In the United States, where around 38 percent of transactions run over card payment networks, four in five of these payments are still made with a physical card present.[49]

For digital transactions to flourish, individuals need to be able to deposit and withdraw cash from their accounts. In advanced economies, people do this at bank branches or ATMs, but these types of activities are less common in emerging economies. Instead, financial-services providers establish agents who often also own small shops and provide CICO services. These agent networks need to be widespread, so that people can easily move money in and out of their digital accounts. Otherwise, individuals who receive their salary, a remittance, or a government subsidy in a digital account may prefer to withdraw the full amount in cash immediately rather than run the risk of not having the cash they need later. Across the world, countries that attain higher levels of digital transactions tend to have at least a minimum density of outlets where people can deposit and withdraw cash. Of countries with high ATM density (defined as more than 100 ATMs per 100,000 population), 60 percent have a high share of digital transactions (defined as more than 30 percent of transaction volume sent digitally); in contrast, just 25 percent of countries with low ATM density have a high share of digital transactions.[50]

In some countries where mobile money is not yet widespread, infrastructure for accepting physical card payments may be important. In order to accept physical card payments at the point of sale, merchants must have a card-reading machine. This can be either a dedicated terminal or a smartphone and a "dongle", a card reader that plugs into the phone. Some emerging economies, particularly those with higher average incomes, have widespread card ownership and use of physical cards. In Brazil, for instance, 59 percent of adults have a debit card and 32 percent have a credit card.[51] Emerging economies with low card penetration may be able to leapfrog card technology almost entirely, moving directly to fully digital solutions with no physical cards.[52]

DIGITAL FINANCIAL SERVICES EXPAND CUSTOMERS' ACCESS AND THE REACH OF PROVIDERS

Nearly **80%** of adults in emerging countries had a mobile subscription in 2014

Digital finance has an opportunity to flourish in emerging economies because network coverage is near ubiquitous and rapidly increasing in quality, and use of mobile phones is growing quickly. In 2014, nearly 80 percent of adults in emerging countries had mobile subscriptions. By 2020, this share is projected to reach over 90 percent. This suggests that a large number of people who do not have a financial account today could gain access to finance through their mobile phone (Exhibit 8).

Being able to access financial services via a mobile phone overcomes significant physical barriers to access, including the often long distances that people in rural areas must travel to reach the nearest bank branch. The familiarity of a mobile phone can also help individuals overcome nervousness about using a formal financial account. People may be intimidated by the prospect of visiting a bank but are accustomed to sending SMS texts or trading prepaid minutes with family members. In Nigeria, 56 percent of adults do not have a bank account, and 80 percent of cash in the economy is not deposited in a bank. Trust in banks is low, and many citizens, particularly those living in rural areas, are not familiar with financial

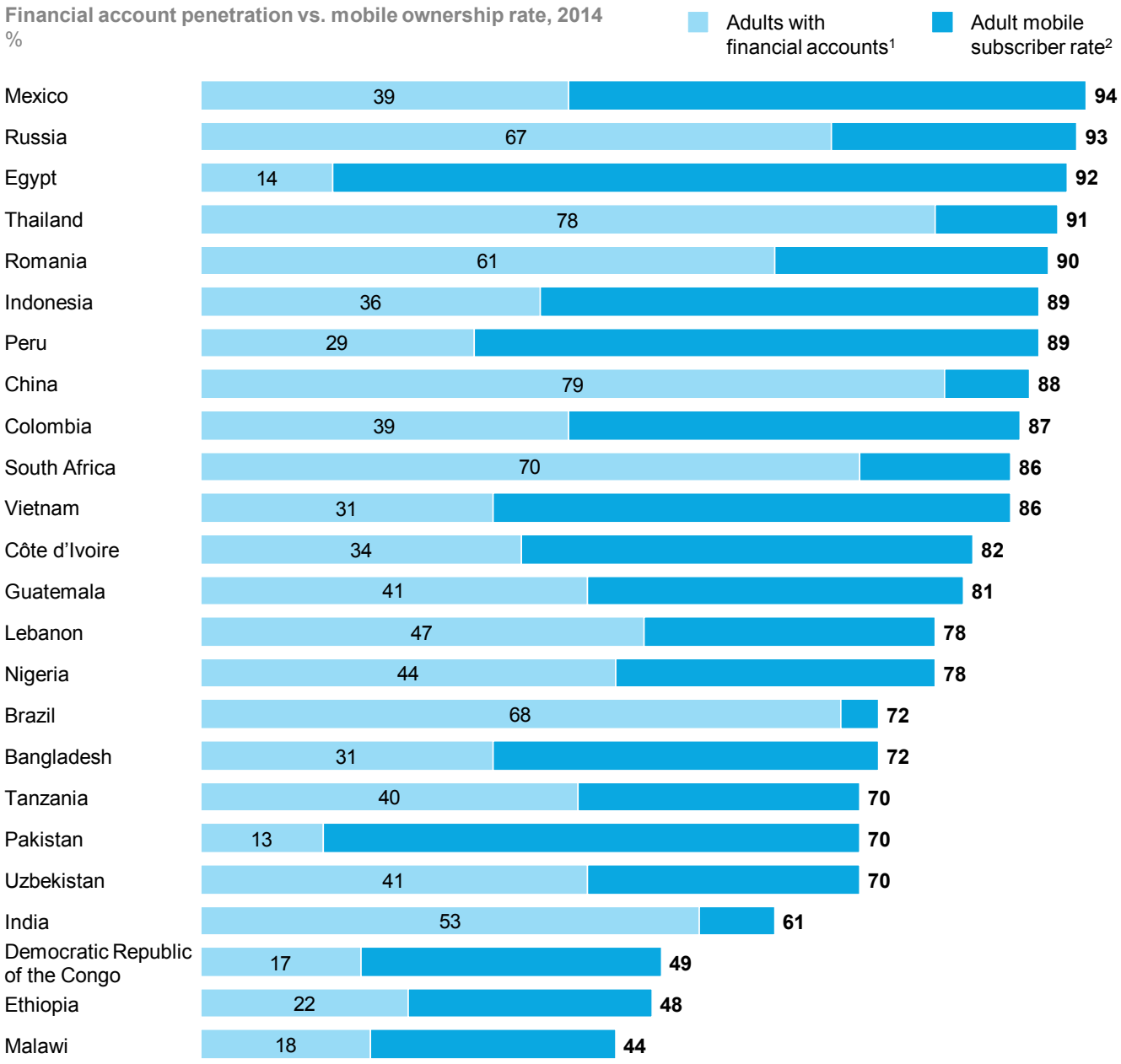
[48] McKinsey Global Payments Map 2016 (2014 data).
[49] Ibid; Euromonitor 2014.
[50] McKinsey Global Payments Map 2016 (2014 data); Global Findex database 2014, World Bank, April 2015
[51] Global Findex database 2014, World Bank, April 2015.
[52] Ibid.

services. At the same time, more than 80 percent of Nigeria's adult population, including an increasing number of poor people, has a mobile phone today.[53]

Access to traditional financial accounts increases slowly as national income levels rise. However, the use of mobile-money accounts shows no correlation with income; indeed, the highest penetration today is in some of the world's poorest countries (Exhibit 9). A critical mass of people and businesses need to use the system for it to get started; once a network of active digital users is established, increasing numbers will want to join. This means that solutions cannot target the poor exclusively.

Exhibit 8

There is significant potential to provide financial services via mobile phones to underserved people in emerging markets



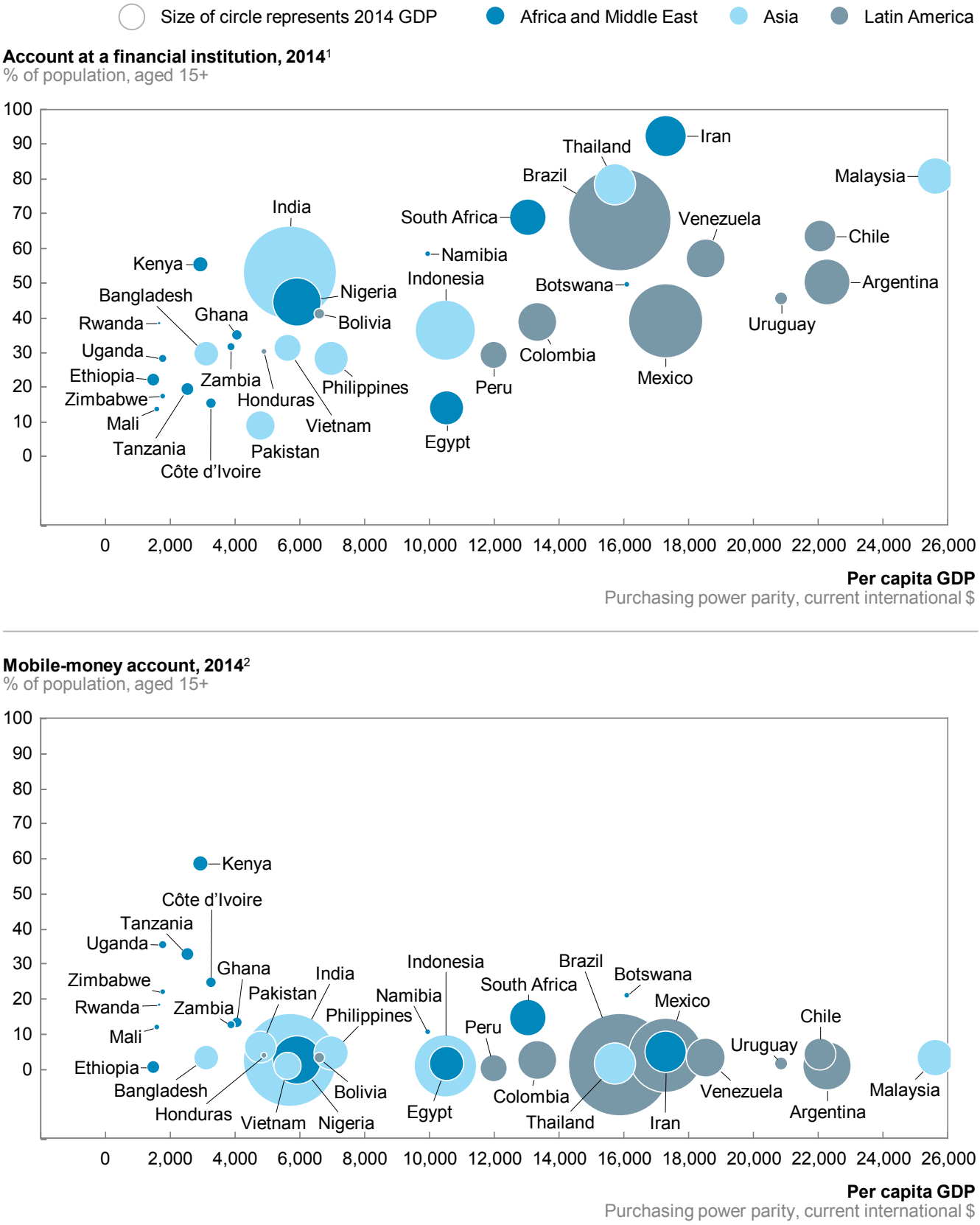
1 Denotes the percentage of respondents (15+ years in age) who report having an account (by themselves or with someone else) at a bank or another type of financial institution, or through a mobile-money service.
2 Percentage of unique mobile subscribers over total adult (age 15+) population.

SOURCE: GSMA; Global Findex database 2014, World Bank; *World development indicators*, World Bank; McKinsey Global Institute analysis

[53] GSMA Intelligence Data, 2016.

Exhibit 9

Access to financial accounts depends on national income levels—but this is not the case with mobile-money accounts



1 Percentage of respondents who report having an account (by themselves or with someone else) at a bank or another type of financial institution.
2 Percentage of respondents who report personally using a mobile phone to pay bills or to send or receive money, wages, government transfers, or payments for agricultural products through a GSMA Mobile Money for the Unbanked (MMU) service in the past 12 months.

SOURCE: Global Findex database 2014, World Bank; World Bank; McKinsey Global Institute analysis

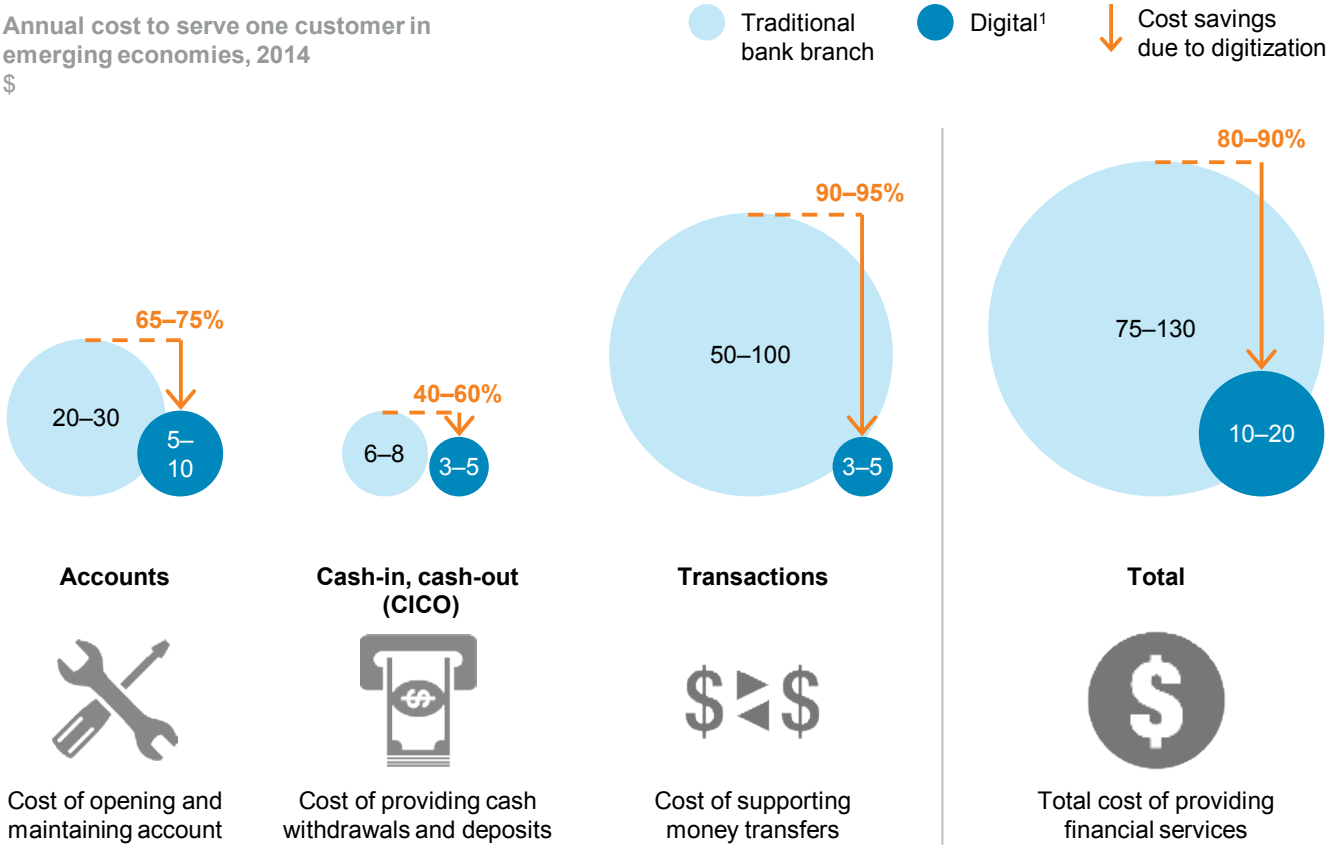
DIGITAL LOWERS THE COST OF PROVIDING FINANCIAL SERVICES BY 80 TO 90 PERCENT

Digital "push" payments up to **95%** less expensive than non-digital payments

Every step toward full digitization of financial services helps to reduce costs, making it profitable for providers to serve a much larger range of customers. For financial-services providers, we find that the cost of serving a customer using mobile-money accounts can be up to 80 to 90 percent lower than using physical branches (Exhibit 10).[54] The savings come from the cost of creating and maintaining an account, processing payment transactions, and providing people with the ability to deposit and withdraw cash into accounts. For example, in well-designed and well-run payment systems operating at scale, "push" payments initiated by the sender through digital transaction channels can cost up to 95 percent less than existing non-digital payments.[55] Even setting up and maintaining an account digitally creates enormous savings for financial-services providers. Overall, the lower cost base enables providers to reach more customers who would otherwise not be profitable prospects.

Exhibit 10

Digital technologies cut the cost of providing financial services by 80 to 90 percent



1 To reach full cost savings, sufficient improvements are necessary in system design, scale, and operational efficiencies.

SOURCE: McKinsey Global Payments Map; Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems,* Bill and Melinda Gates Foundation, September 2013; McKinsey Global Institute analysis

[54] Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems*, Bill and Melinda Gates Foundation, September 2013; McKinsey Global Payments Map 2016 (2014 data).

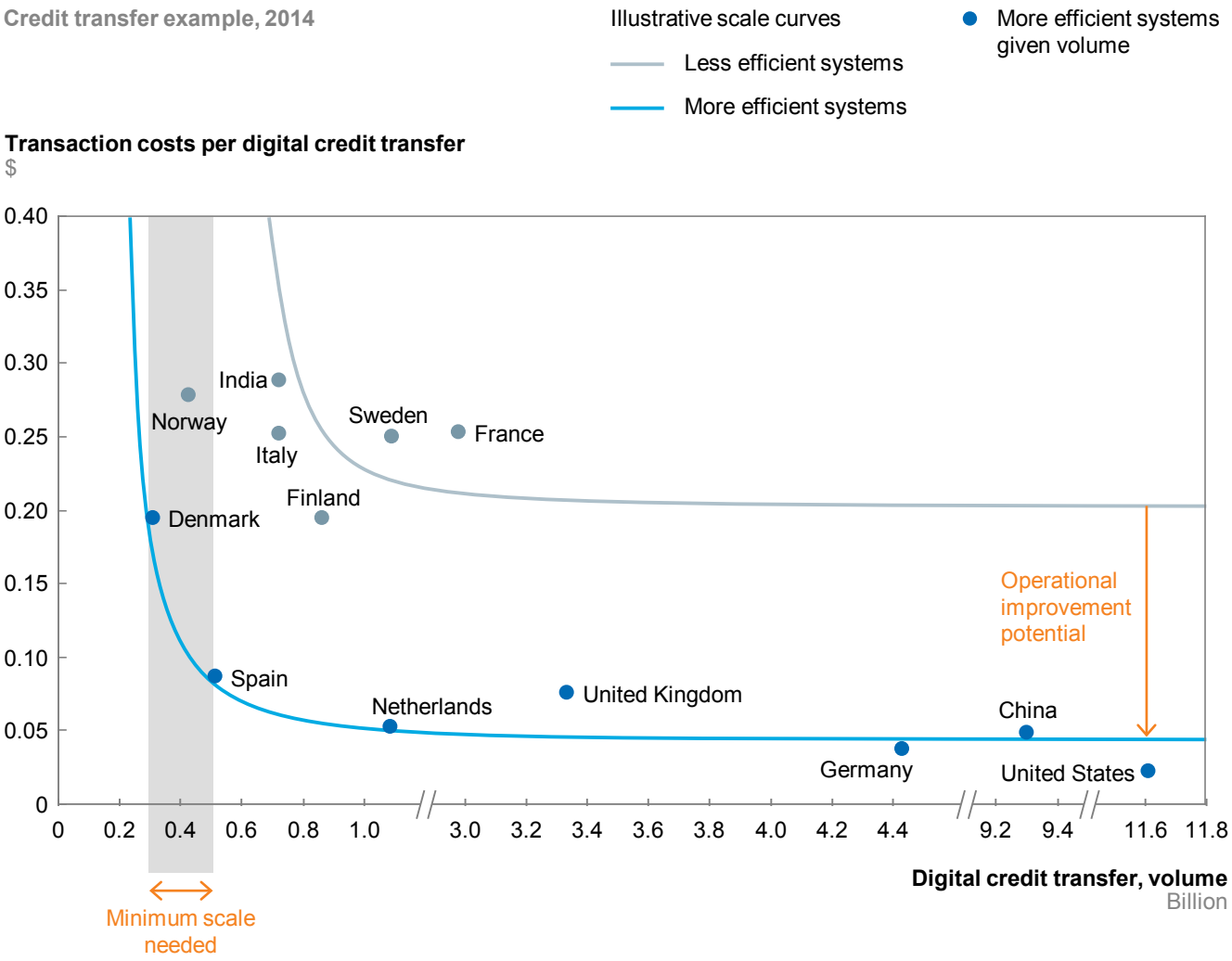
[55] Ibid.

As the network of digital-payment users grows, overall costs incurred by providers fall further because of economies of scale (Exhibit 11). Transaction costs can decline by as much as 50 percent when scale doubles.[56] As costs decrease, providers can serve ever more customers profitably, in more ways, and charge lower prices, and so more people are included. With these network effects, adoption can be rapid. In Kenya, the number of users of the M-Pesa mobile-money system grew from zero to 40 percent of adults in just three years following its 2007 launch.[57] One of the advantages of digital transactions is that providers can serve customers who transact frequently and in small amounts cost-effectively. This allows for a full standard suite of financial services to become viable for people on lower incomes, who often make such small-scale transactions.

Exhibit 11

Minimum scale and operational efficiency are essential to reduce service cost

Credit transfer example, 2014



SOURCE: McKinsey Global Payments Map 2016 (2014 data); McKinsey Global Institute analysis

[56] Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems*, Bill and Melinda Gates Foundation, September 2013.

[57] Ignacio Mas and Dan Radcliffe, "Mobile payments go viral: M-Pesa in Kenya," *Journal of Financial Transformation*, volume 32, 2011.

DIGITAL PAYMENTS ENABLE NEW BUSINESS MODELS AND REVENUE STREAMS

The benefits of digital payments go far beyond driving down costs and increasing the convenience of existing transactions. Like electricity or roads, a digital-payment network can become part of the basic infrastructure of an economy and can underpin a broader and more innovative array of economic activity. We consider three important emerging business models. The first is financial services based on the increased transparency and information about users generated by digital payments. The second type builds on the idea that digital payments allow people to transact in small amounts, creating new opportunities based on micropayments. The third type of new business model is e-commerce and on-demand services made possible by digital payments (Exhibit 12).

Exhibit 12

Digital financial services enable the creation of new business models

New business model		Example services enabled	Example companies
New financial-services products	Individuals[1]	Digital payments platforms and wallets	▪ Alipay, Baidu Wallet, WePay(China) ▪ EasyPaisa, OneLoad (Pakistan) ▪ HelloCash, M-Birr (Ethiopia) ▪ Pagatech, Quickteller (Nigeria) ▪ Paytm (India) ▪ Zuum (Brazil)
		Online peer-to-peer lending	▪ Kubo Financiero (Mexico) ▪ Lufax, Yirendai (China)
		New insurance models	▪ Kifiya Crop Insurance (Ethiopia) ▪ MicroEnsure (16 countries in Asia and Africa)
		Personal financial planning	▪ GuiaBolso (Brazil)
	MSMEs	Supply chain financing	▪ Ant Financial, Gome, WeBank (China)
		Cash management	▪ Clip, Red Qiubo (Mexico) ▪ Ezetap (India) ▪ iZettle (13 countries including Brazil and Mexico)
		Digital salary payments	▪ Most example businesses above providing digital payments services
Mobile micro-payments		Digital installment payments for health and education	▪ Bridge International Academies (India, Kenya, Liberia, Nigeria, Uganda)
		Pay-as-you-go investment model	▪ M-Kopa Solar (Kenya)
		Layaway plans	▪ KickStart International (Kenya)
Digitized businesses		E-commerce	▪ Alibaba (China) ▪ Flipkart, FreeCharge (India)
		On-demand services	▪ Didi Chuxing car ride service (China) ▪ Hello Doctor mobile health care (Ethiopia)
		Online labor platforms	▪ Freelancer, Upwork (global)

1 These services are relevant to micro-enterprises as well.

SOURCE: McKinsey Global Institute analysis

New types of financial services are emerging as mobile payment networks grow and leave data trails

As the network of mobile payments grows, access to financial services broadens not only in terms of the number of people who can be served, but also in the types of financial-services products delivered digitally. Companies are creating innovative financial products using the rich datasets created by digital payments—datasets that were unthinkable in emerging economies even ten years ago.

By conducting financial transactions with a mobile phone, individuals leave a digital data trail that contains valuable information for financial providers. This data trail can transform providers' understanding of their customers, how they transact, and what other products they might find useful. Providers and credit bureaus can better assess credit risk, allowing for the extension of credit and other services to individuals and businesses whose past transactions suggest they are low risk. Providers can issue, monitor, and collect payments on an automated basis, reducing the management costs of credit and allowing them to extend smaller loans to customers who may previously have been perceived as risky.

Several companies are finding groundbreaking ways to develop improved credit-risk profiles for users of mobile phones and digital wallets. In Kenya, for instance, some fintech companies use mobile money payment data and other mobile phone usage data including travel and communication patterns to estimate the risk profile of borrowers who lack a verifiable financial history. Such data allow companies to offer loans at rates far below alternatives from informal lenders and microcredit. One such company, Tala, has made more than 200,000 loans totaling nearly $5 million and has achieved repayment rates above 90 percent.[58]

Digital finance has rapidly opened up many markets to P2P lending, filling a gap in which both savers and borrowers felt underserved. In China, which has a combination of high household savings rates, low rates on deposits, and credit-constrained MSME and household markets, nearly 2,000 such lenders have emerged. In Mexico, high microfinance interest rates have led to the creation of Kubo.financiero, a P2P lender that matches middle-class and wealthier savers with small entrepreneurs and households looking for microloans. Borrowers submit requests that are automatically risk-assessed, and lenders then select a number of borrowers with a desired risk profile. Kubo's lending has grown rapidly to $5 million, and delinquency rates have remained far below comparable microfinance levels to date—providing lenders with double-digit returns.

There are also new products designed to meet the needs of MSMEs. New platforms are using payments data to evaluate and manage supply chains, giving MSMEs similar capabilities as larger competitors. One example is iZettle, a Swedish payment processor operating in Brazil, Mexico, and 11 other countries. iZettle in Mexico provides hardware and apps that enable small businesses to process digital transactions, track and evaluate their sales data, and monitor profitability—all through a smartphone. Among the new features iZettle is considering is one that automatically orders more stock as goods are sold.

When different types of companies compete to offer financial services, the opportunities for innovative new business model development broaden. While traditional finance has been the province of banks, new digital finance will rely on a much wider variety of players, including banks but also other financial institutions, telecoms companies, postal services, mobile phone handset manufacturers, and fintech companies. Digital technologies blur lines between sectors, shifting value among them as occurred when, for instance, television overtook radio, or more recently when online media gained predominance over print

[58] Shivani Siroya, "A smart loan for people with no credit history," TED Talk, February 2016.

advertising.[59] In Kenya, a telecoms company developed the popular M-Pesa mobile-money service. India is launching new payments banks to bring innovation to the market and has dispensed licenses to a range of fintech companies, telecoms firms, and even the local postal service.

400
Bridge Academy schools serving 100,000 students administered using digital payments

Micropayments can create new business models

Digital payments enable people to transact in very small amounts. This opens the door to many new types of businesses including micropayments to schools, installment plans for durable goods, and services for which customers pay per use.

In Kenya, digital payments enabled an entirely new business model for developing and funding low-cost private schools—the cashless "academy in a box" launched by Bridge International Academies. School administration is run entirely on tablets and smartphones, eliminating the need for accounting and finance functions and their associated costs. School fees are paid in monthly micropayments using M-Pesa, supporting teacher salaries, supplies, and other costs.[60] Founded in 2009, Bridge expanded to nearly 400 schools and over 100,000 pupils by 2014, and has since begun to expand to Uganda, Nigeria, and India.

Businesses can pay salaries more frequently through digital platforms. Zuum, a mobile-payment platform in Brazil that pairs a mobile-money account with a debit card, has started selling a product for business-to-customer (B2C) payrolls allowing employees to receive their wages into their mobile-money account, with the possibility for week-to-week or even daily wage payments. This is particularly valuable for low-income employees who often cannot wait a month to receive a payment.

Digital payments also enable installment and layaway plans, in which customers make small payments toward the full cost of an item whenever they can. Over time, after the full purchase price is paid, the customer takes home the good. Layaway plans are attractive because of the flexibility they give customers who can decide when to make payments, and how much, and as such are more flexible than most traditional loan repayment schedules. Layaways can also reduce risks for the seller, who would otherwise have to choose between extending credit or potentially forgoing sales. KickStart International, which sells water pumps to farmers in East Africa, recently launched layaway products via M-Pesa.

The most extreme example of micropayments is the pay-as-you-go model in which an individual pays per use. Pay-as-you-go offerings involve leasing an expensive asset that can be turned off remotely by the provider when payment is not received. Families can enjoy the benefits from an asset that they would not be able to purchase, while the provider can easily collect payments, making the venture both profitable and low-risk (see Box 3, "Pay-as-you-go and M-Kopa Solar").

[59] See, for instance, *Disruptive technologies: Advances that will transform life, business, and the global economy*, McKinsey Global Institute, May 2013.

[60] Bridge International Academies website, www.bridgeinternationalacademies.com/

Box 3. Pay as you go and M-Kopa Solar

Kenya was a conducive environment for the adoption and proliferation of pay-as-you-go solar—off-grid photovoltaic systems coupled with connectivity or IT-enabled payment systems. M-Kopa Solar pay-as-you-go solar panels can power lighting, mobile phone charging, radio and, digital TV.

The M-Kopa model piggybacks on the country's already well-established mobile-money system. It works through the mobile-money provider M-Pesa, which is owned by Safaricom, the country's leading telecoms provider. By the end of 2015, nearly 70 percent of Kenyan adults were active users of M-Pesa mobile-money services.

In the M-Kopa model, consumers put down a small deposit for the solar panel and pay per use via a mobile phone every time they use the electricity generated. Providers can turn the service off if the user misses a payment. This maximizes repayment and minimizes collection costs. Without the ability to collect payments for each use, providers would not be able to ensure that use matched payment. Particularly in rural areas that tend to be off-grid, collection costs would be very high. Digital collection, though, is instantaneous and cheap. As of July 2016, M-Kopa Solar had connected more than 375,000 homes to affordable solar power in East Africa, and current customers are projected to save $280 million over the next four years by using M-Kopa Solar instead of buying kerosene.[1]

[1] M-Kopa Solar website, http://solar.m-kopa.com/about/our-impact/

More than
11M
rides a day through Chinese ride-sharing platform

Digital payments enable e-commerce and on-demand services to thrive

Digital payments can also enable the growth of e-commerce channels and "sharing economy" markets such as ride sharing and employment matching.

The developing world is increasingly home to success stories that replicate those of significant players in advanced economies. In e-commerce, Alibaba is now the world's largest retailer by gross merchandise value, ahead of both Wal-Mart and Amazon. By aggregating sales from large numbers of sellers, these e-commerce platforms are able to improve choice for their customers dramatically even while reducing the prices of the items they sell.

Sharing economy and on-demand services are also growing rapidly in emerging economies, mirroring the trajectory of these markets in advanced economies. One example of a rapidly growing ride-sharing platform is China's Didi Chuxing, which is now the world's largest mobile transportation platform. More than 11 million rides a day are completed in over 400 cities. Uber has sold its Chinese business to Didi Chuxing.

•••

Digital technologies, starting with the mobile phone, have the power to transform finance in developing economies, giving access to finance to many more people and extending the reach for financial-services providers. The cost of providing those services can be dramatically lower if done digitally. As more users join the digital finance network, economies of scale kick in and costs fall even further, a virtuous cycle. Finally, digital enables new business models, creating more service options for customers and additional potential revenue sources for financial-services providers and other businesses. When all elements are working in concert, penetration can lift off rapidly, as we have already seen in several emerging economies. How big could the economic benefits be, for individual countries and for the global economy? In the next chapter, we quantify the significant impact that a comprehensive adoption of digital finance could bring, to individuals, companies, finance providers, and governments.

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3. QUANTIFYING THE BENEFITS OF DIGITAL FINANCE

Widespread use of digital payments and other digital financial services offers major benefits to individuals, small businesses, governments, and providers of finance in emerging economies—and could potentially give a significant boost to their GDP. Just how significant? We have sought to quantify the economic and social impact of digital financial inclusion across the developing world, and in this chapter we describe our findings.

$110B
annual savings for governments using digital payments due to lower leakage

Within the next decade, digital finance could enable 1.6 billion unbanked people to gain access to financial services; of this total, more than half would be women, and 45 percent would be in the bottom two quintiles of the income pyramid. An additional $2.1 trillion in loans could be made to a wide range of businesses and individuals with digital payment histories. Financial-services providers could save up to $400 billion annually in direct costs, and businesses could save 25 billion hours of labor a year by switching from cash to digital payments. Governments in emerging economies could gain $110 billion per year as digital payments reduce leakage in public spending and tax collection—money that governments could devote to other priorities (Exhibit 13).

$400B
annual direct cost savings could be achieved by financial providers

Taking all these effects together, we estimate that $3.7 trillion could be added to the GDP of emerging economies by 2025—a boost of 6 percent compared with a business-as-usual scenario. This additional GDP would expand aggregate demand and could create nearly 95 million new jobs throughout the economy. While this is a sizable increase, our estimate of the GDP opportunity from digital finance likely underestimates its true potential, as our research does not quantify a number of long-term effects such as improved health care and education, a reduced role for the informal economy, and a surge in business innovation.

For our GDP calculations, we used McKinsey's proprietary general equilibrium macroeconomic model, and we tested the robustness of these results with a partial equilibrium Solow growth model. We also used our Solow model to understand specific individual effects of different components of the model. Field research in seven large countries covering a range of income levels and geographies—Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan—informed our quantitative analysis and provided rich insights into the conditions that must be in place to capture the value from digital finance. In addition, we conducted more than 150 interviews around the world with a variety of experts and stakeholders to obtain a more detailed view of the different elements we fed into our model.

Our analysis should be viewed not as a forecast of what will happen, but rather as a sizing of the opportunity. Some countries may reap the full estimated benefits sooner than the ten-year horizon we have chosen to model, while for others the journey could be much longer. However, we hope that our estimate of the value at stake will inspire governments and the private sector to embrace digitization of their financial sectors.

Exhibit 13

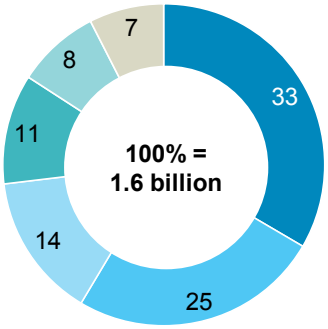
Many stakeholders stand to gain from digital financial services

2014[1] XX Emerging economy total

South Asia | Southeast Asia | China[2]
Africa and Middle East | Latin America | Eastern Europe and Central Asia

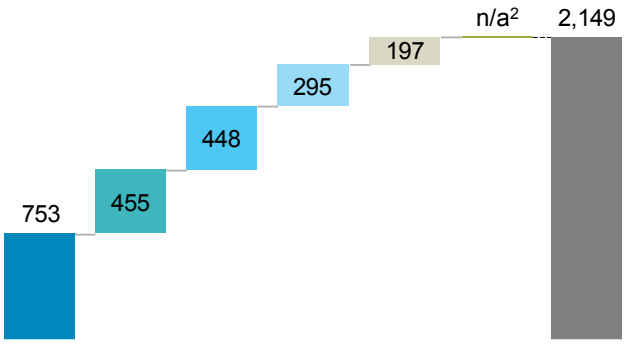
Individuals
Newly included in financial system
%

1.6 billion



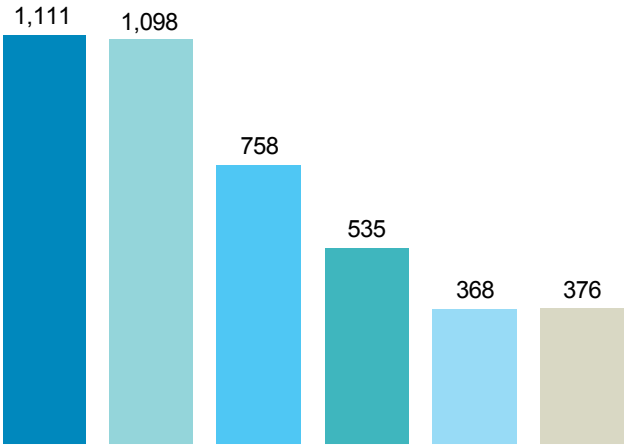
MSMEs and individuals
New credit
$ billion

2.1 trillion



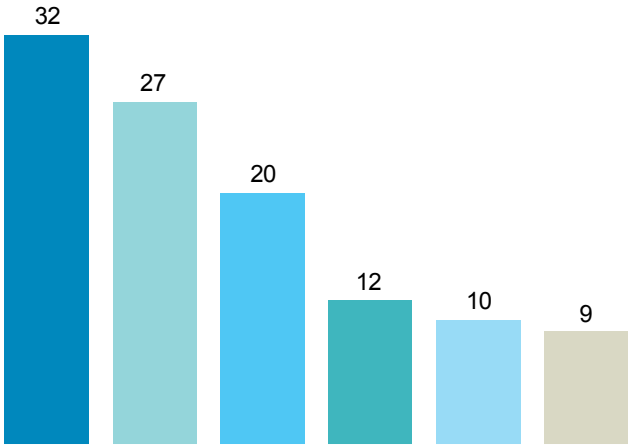
Financial-service providers
New deposits
$ billion

4.2 trillion



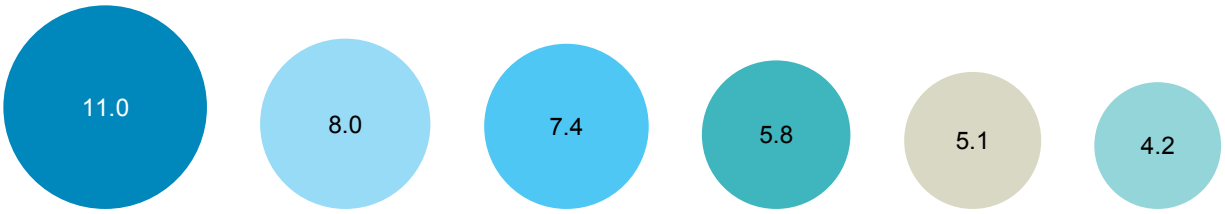
Government
Leakage reduction per annum
$ billion

110 billion



GDP impact of digital financial services[1]
%

6%, or $3.7 trillion, by 2025



1 Stakeholder benefits are calculated using 2014 baseline values, and GDP impact is calculated using 2025 baseline.
2 New credit in China has not been forecasted as current debt levels in the country are already very high.
NOTE: Not to scale. Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

DIGITAL FINANCE OFFERS SUBSTANTIAL BENEFITS FOR INDIVIDUALS, SMALL BUSINESSES, FINANCIAL-SERVICES PROVIDERS, AND GOVERNMENTS

The broad adoption of digital finance offers substantial benefits throughout society, from individuals and businesses to financial institutions serving the system, and governments.

1.6B
more people could gain access to financial services

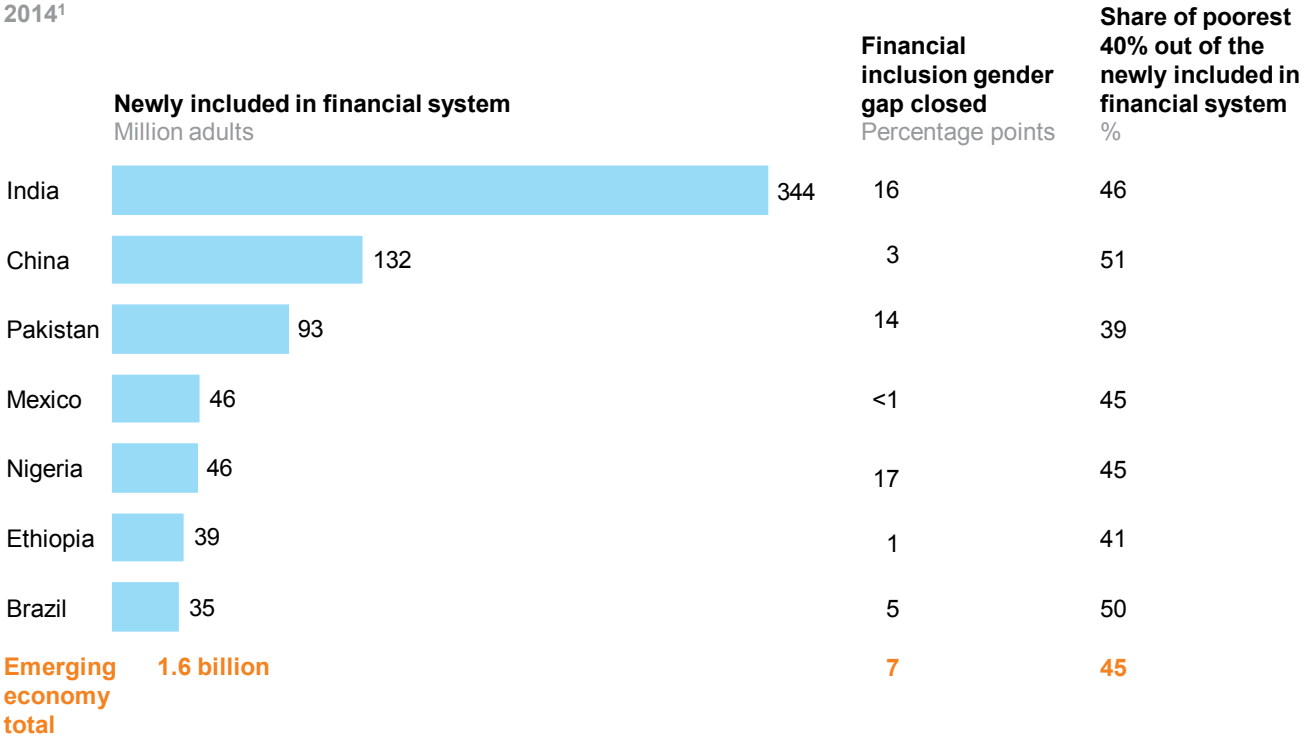
An estimated 1.6 billion individuals could gain access to financial services

As we have noted, digital technologies enable financial-services providers to reach new customers and expand services to people and households already using some formal financial products today. We estimate that the growth of digital finance could open the way for 1.6 billion new account holders to join the formal financial sector, improving their ability to save and invest in their businesses and farms, and helping to smooth their consumption through periods of irregular income (Exhibit 14). The 2.4 billion people in emerging economies who currently have a formal account will also benefit from improved services and additional financial product options.

Exhibit 14

Digital financial services can connect 1.6 billion more individuals to the formal financial system in emerging economies

2014[1]



1 Calculations based on 2014 baseline values.

SOURCE: Global Findex database 2014, World Bank; McKinsey Global Institute analysis

Fifty-five percent of new account holders would be women, significantly narrowing the gender gap in financial inclusion. This would provide significant direct benefits to women and their families, while also generating broader social and economic dividends. Empirical evidence demonstrates a positive relationship between female financial inclusion and women choosing to devote funds to investment in education, health care, and nutrition—all of which create substantial economic benefit for future generations.[61]

[61] Matthias Doepke and Michèle Tertilt, *Does female empowerment promote economic development?* Centre for Economic Policy Research discussion paper number 8441, June 2011.

Forty-five percent of those who would gain access to financial services would be in the poorest two quintiles of the income distribution. Poor people stand to gain from digital finance perhaps more than any other group. They are disproportionately employed in the informal economy and must cope with low and irregular incomes. Their need for financial services is pressing. Research into poor households in Bangladesh and India finds that annual financial flows through informal instruments was between 75 percent and 330 percent of average household income; in South Africa, this figure was around 500 percent.[62] Digital financial products can help poor people save and transact with greater security and certainty. Research in Kenya found that families with access to M-Pesa mobile money were able to withstand significant financial shocks, such as illness, without reducing their consumption; instead, they were able to receive domestic remittances from a range of people including friends and family. In contrast, those without M-Pesa services cut their consumption by 7 percent in similar circumstances.[63] Formal financial tools can also help households increase investment, raise their income, and escape poverty. One study found that Malawian farmers whose income from crop sales was deposited directly into accounts spent 13 percent more on inputs for their next crops and achieved a 21 percent average increase in yields from the harvest, in comparison to those farmers receiving crop sale payments in cash.[64]

$2.1T
of loans could be made available, largely to MSMEs

Micro, small, and medium-sized businesses and individuals could gain access to $2.1 trillion in new loans and improve their financial management

Worldwide, small businesses are responsible for the majority of employment, yet financial-services providers have long neglected them in favor of larger and more formal businesses. Moreover, small enterprises that transact predominantly in cash incur high cash management costs, face high risk of theft, and find it difficult to monitor and optimize the performance of their businesses. As noted in Chapter 1, half of all MSMEs in emerging economies lack sufficient access to credit. By enabling lenders to better assess credit risk, digital payments would go a long way toward closing this gap—unlocking an additional $2.1 trillion in credit for MSMEs and individuals, as our analysis finds (Exhibit 15).

In addition, the expansion in digital payments and other financial services makes it possible for MSMEs to improve their management of cash flow and improve their bottom line. Take as illustration the owner of a small rural store who starts accepting cards or mobile payments through a digital POS on a smartphone. By doing so, the proprietor can view sales records and quickly place an order for replacement inventory to ensure that goods are available to meet demand. This allows more tailored management of suppliers and makes it easier to market to different customers.

Finally, as is the case with individuals, digital accounts can help MSMEs reduce the cost—and risk—of dealing with cash. Many small businesses today incur significant costs from the security measures needed to protect their cash from theft by employees or others. They can be constrained from growing beyond a small number of locations due to the challenges of securing cash at a location without the owner present. Digital payments, by reducing the risk of theft, will help address this common constraint to small business expansion.

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62 Daryl Collins et al., *Portfolios of the poor: How the world's poor live on $2 a day*, Princeton University Press, 2009.

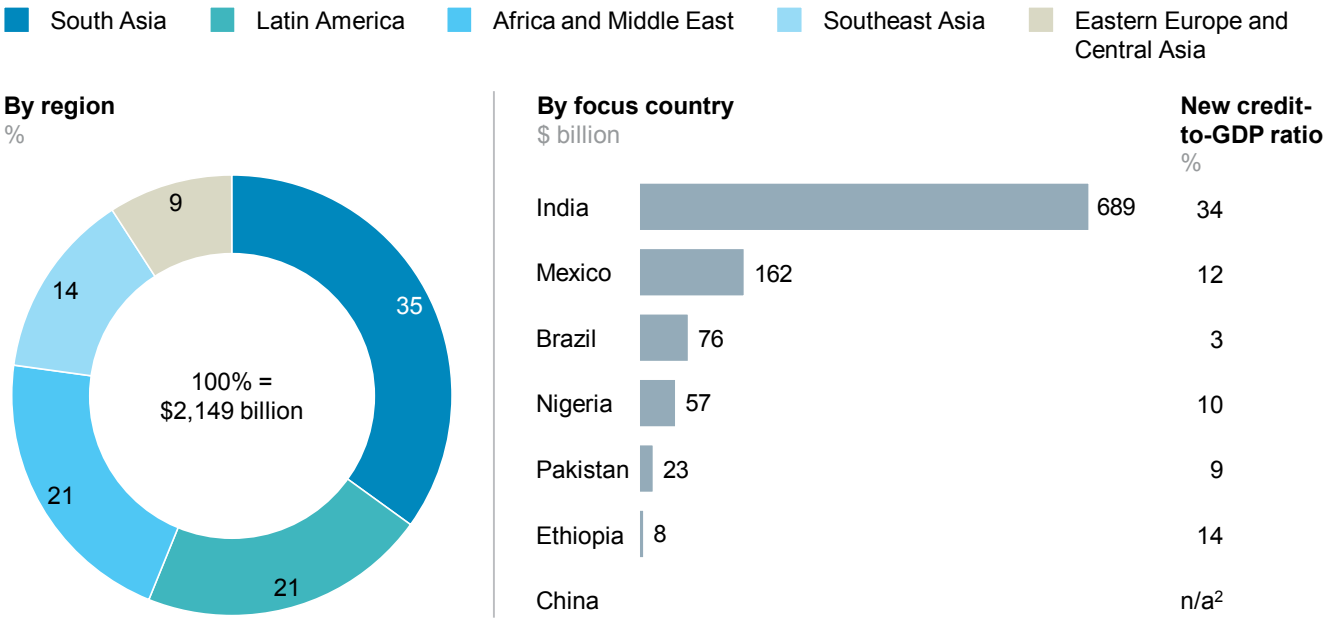
63 William Jack and Tavneet Suri, "Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution," *American Economic Review*, volume 104, number 1, January 2014.

64 Lasse Brune et al., *Facilitating savings for agriculture: Field experimental evidence from Malawi*, NBER working paper number 20946, February 2015.

Exhibit 15

MSMEs and individuals in emerging economies could obtain $2.1 trillion in new loans due to digital financial services

New credit in developing countries, 2014[1]



1 Calculations based on 2014 baseline values.
2 New credit in China has not been forecasted as current debt levels in the country are already very high.
NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

$4.2T
new deposits could be obtained by financial-services providers

Financial-services providers could gain $4.2 trillion in new deposits and cut costs by $400 billion a year from digitized finance in emerging economies

In addition to the huge benefits digital finance offers individuals and businesses, it represents a significant and profitable opportunity for a range of financial-services providers. Shifting from cash to digital payments will lower providers' cost structure and generate more than $400 billion annually in cost savings. It will also open up profitable new ways to enlist new customers and could raise $4.2 trillion in new deposits—equivalent to 14 percent of the emerging world's GDP—as people shift their savings from informal mechanisms and cash into the financial system (Exhibit 16).

Banks in developing countries have traditionally given loans mainly to government entities and large businesses (often state-owned), to the detriment of mid-sized and smaller businesses. Digital finance, however, creates an opportunity to increase the volume and profitability of loans to these MSMEs significantly. As providers sign up new customers, their deposit balances will grow, providing a significant new source of funding to expand their lending. In addition, new customer relationships and use of the digital data trail will allow providers to better assess credit risk, expanding their potential pool of borrowers. Of course, many small businesses and poor people in emerging economies will remain risky borrowers, regardless of whether they use digital finance. Nonetheless, there is ample empirical evidence that many productive, creditworthy midsized and smaller businesses cannot access credit today. Digital finance offers a way to reach these potential borrowers.

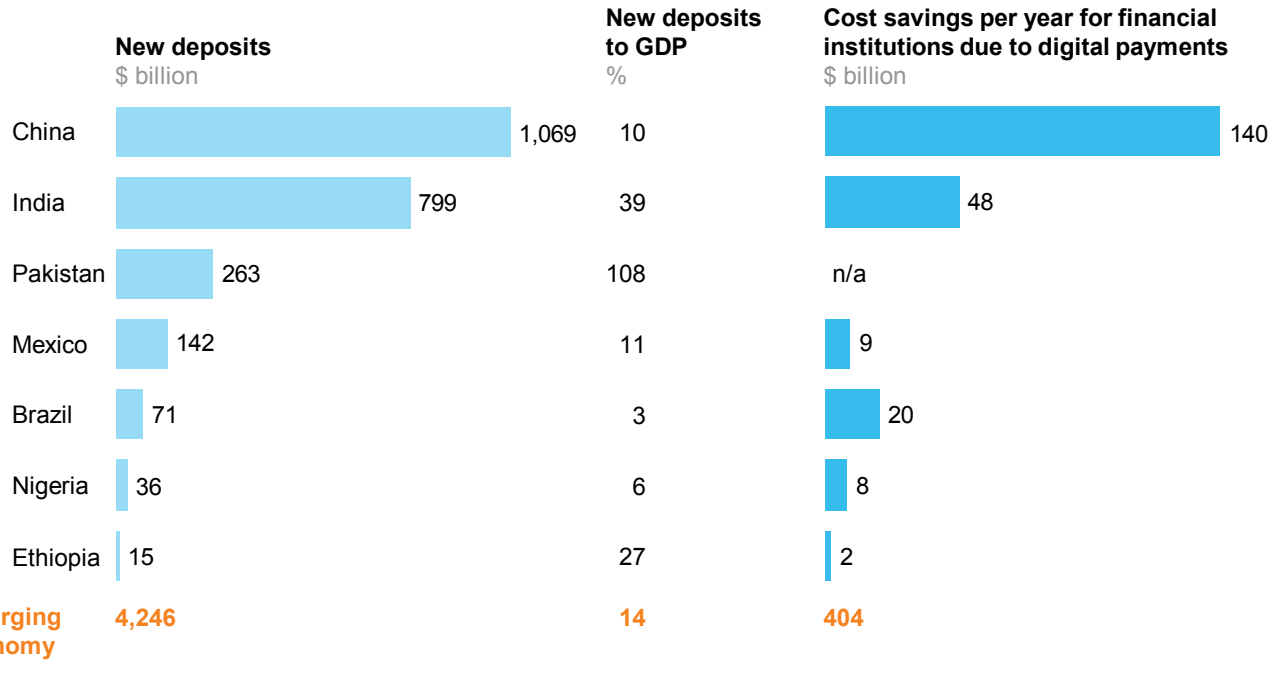
We estimate that a large share of the $2.1 trillion in new loans from financial-services providers will likely be to MSMEs that are productive and have good investment opportunities. It is important to note that this new lending can be done sustainably: our

analysis assumes limits on the leverage ratio of financial-services providers, as well as on the business sector and household sector of each country. These constraints limit the amount of potential new lending in some of our focus countries, most notably in China, because leverage in their economies is already high. Nonetheless, even with this conservative approach, our analysis suggests that new lending can become a significant profit engine for digital financial providers, with the potential to earn interest and returns on equity above those of lending to large corporate and public-sector clients.

Exhibit 16

Digital financial services could raise about $4.2 trillion of new deposits and save financial institutions in emerging economies about $400 billion a year in costs

2014[1]



1 Calculations based on 2014 baseline values.
NOTE: Not to scale.

SOURCE: McKinsey Global Institute analysis

This opportunity is not restricted to banks—a diverse set of players can prosper by providing digital finance to underserved customers. Telecoms operators can leverage their broad agent networks and customer relationships to develop mobile-money products, as they have already done in East Africa. Fintech companies can rapidly launch innovative products targeting unmet needs, as P2P lenders have done around the world in both developed and emerging economies. Retailers and wholesalers can leverage their distribution networks and existing customer base to launch innovative payment and other products. In addition, a range of technology and banking services firms can take advantage of the significant build-out of technology infrastructure that must occur to enable this transition.

Governments could gain $110 billion a year by reducing leakage in expenditure and tax collection

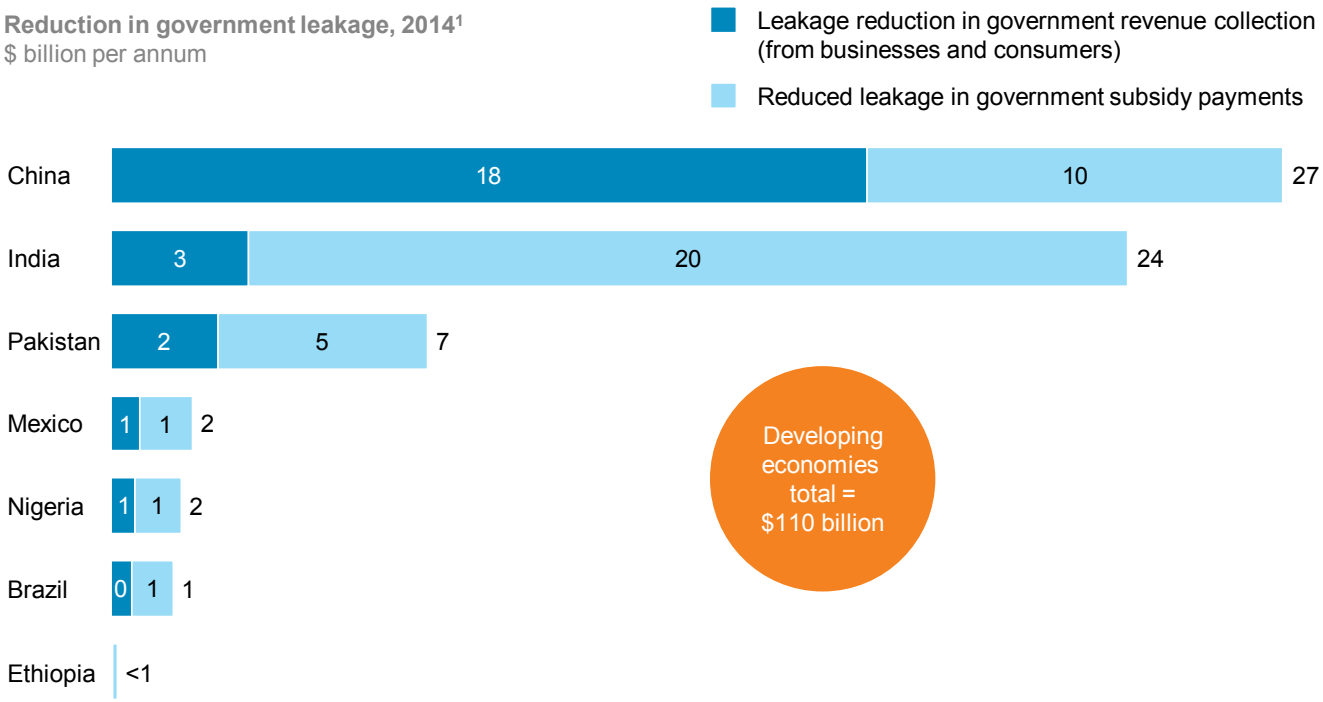
Digital payments have the potential to improve government finances in emerging economies and improve the effectiveness of government spending by helping to target it more accurately. We quantify several sources of benefits for governments: plugging leaks in

expenditure and tax collection, improving the targeting of government subsidies, and efficiency gains from government operations as a result of digitizing payments.

First, we estimate that total reduction in leakage in government expenditure and tax collection could amount to $110 billion annually (Exhibit 17). For government spending, we estimate potential savings of $70 billion annually, as digital payments could reduce inefficiencies endemic to current payment flows by eliminating leakage and by lowering transaction and administrative costs.[65] As a result, spending on infrastructure and services such as health and education will become more effective, improving the physical and human capital in emerging economies. In addition, digitizing government tax collection can boost revenue and reduce tax receipts lost to fraud, generating a further $40 billion a year for governments in emerging economies.

Exhibit 17

Digital payments can reduce the leakage in public spending and collection by $110 billion a year in emerging economies



1 Calculations based on 2014 baseline values.
NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

Second, there are large potential gains from better targeting of subsidies, such as those for staple foods and fuel. As discussed earlier, these programs are a popular form of social welfare in many economies, but they are subject to the risk of fraud and theft and they also disproportionately benefit wealthier households with greater purchasing power. Countries with strong digital financial inclusion could replace cash-based social payments and subsidy programs with targeted, direct payments. This would drive significant costs savings and reduce theft while simultaneously improving the social outcomes by better targeting spending to its intended beneficiaries—the poor.

[65] *Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, October 2010.

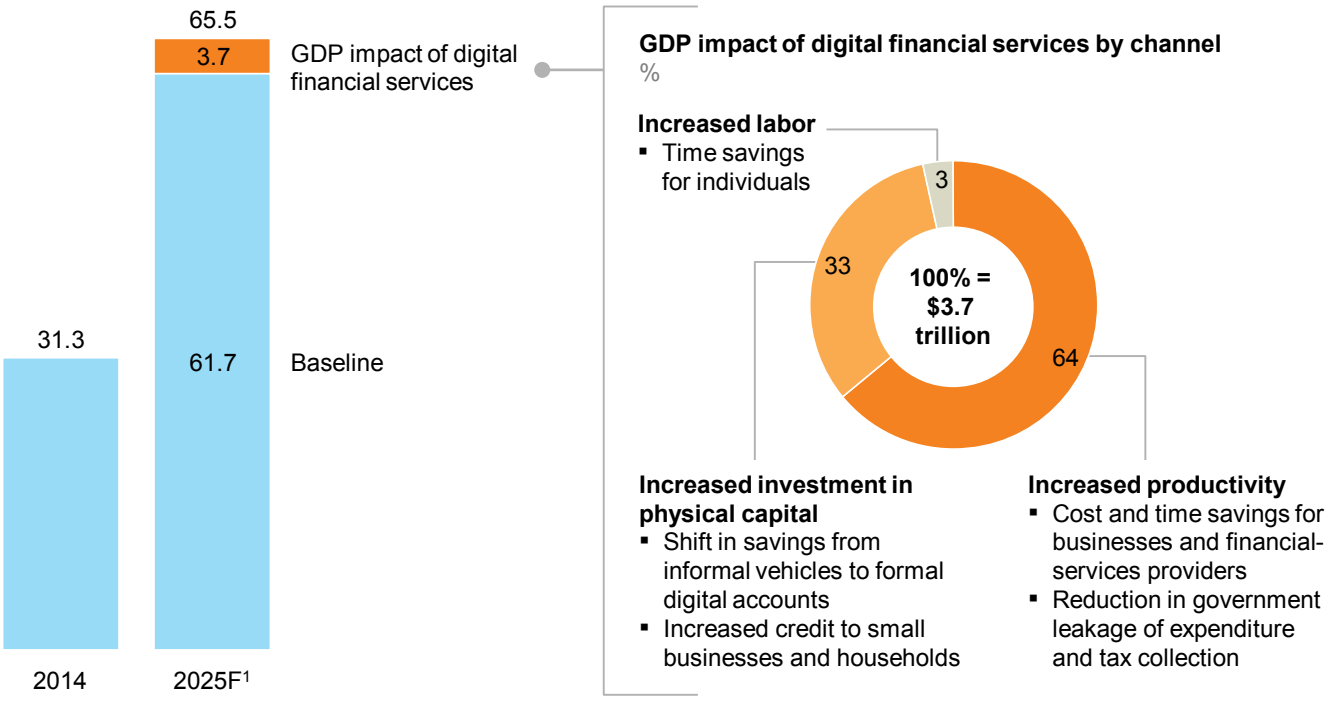
Third, digital payments create efficiency gains in many other areas of government activity. For instance, digital payments have significantly improved the effectiveness of social programs by enabling more timely payments to workers. Consider the experience of Côte d'Ivoire. After that country's 2011 civil war, school fees were paid almost exclusively in cash and were subject to high levels of bribery, theft, and other security issues, eroding the quality of the education system. Between 2011 and 2014, the Ministry of National and Technical Education began requiring that school payments be made digitally, with most parents using mobile money to do so. The result was a drastic reduction in lost payments, fraud, and theft, as well as in the administrative burden of managing cash.[66]

BROAD USE OF DIGITAL FINANCE COULD ADD $3.7 TRILLION, OR 6 PERCENT, TO THE GDP OF EMERGING ECONOMIES BY 2025

Our estimates suggest that proliferation of digital financial services in emerging economies could add $3.7 trillion to their collective GDP in 2025—or 6 percent above the business-as-usual scenario (Exhibit 18).[67] The potential impact for an individual country varies significantly, as we discuss below. We arrived at our estimate of the economic impact for developing countries across the globe by scaling up more detailed estimates from the seven countries that we visited for our research (see Box 4, "How digital finance can boost GDP").

Exhibit 18

Digital financial services could boost the GDP of emerging economies by $3.7 trillion—or 6 percent above baseline projected GDP



1 Based on average GDP growth forecast of emerging countries from IHS and Oxford Economics.
NOTE: Numbers may not sum due to rounding.

SOURCE: IHS; Oxford Economics; McKinsey Global Institute analysis

[66] Jennifer Frydrych, Claire Scharwatt, and Nicolas Vonthron, *Paying school fees with mobile money in Côte d'Ivoire: A public-private partnership to achieve greater efficiency*, GSMA, September 2015.

[67] This result is in line with the few other estimates of the impact of financial inclusion on GDP available. See, for example, Era Dabla-Norris et al., *Distinguishing constraints on financial inclusion and their impact on GDP, TFP, and inequality*, NBER working paper number 20821, January 2015.

Box 4. How digital finance can boost GDP

Our results are based on a detailed microeconomic analysis of the impact that digital finance may have on saving, investment, and productivity, based on academic research, our field research interviews, and proprietary data sources. We then use these as inputs to McKinsey's Global Growth Model, a general equilibrium macroeconomic model, to determine the impact on GDP. We built a unique model for each of the seven focus countries in this research—Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan—that account for more than half of the population and GDP of all emerging economies. We developed detailed data inputs and assumptions for each focus country from publicly available and proprietary McKinsey datasets, and refined our assumptions with input from more than 150 interviews conducted during visits to each country. GDP forecasts for the seven focus countries were then extrapolated to 152 emerging economies to arrive at our global estimate.

Digital finance can boost GDP through three principal channels: digital payments increase productivity of financial and non-financial businesses and governments; broader financial inclusion of people and businesses enables the formal financial system to capture more of the saving in the economy and in turn extend more credit, increasing investment; and digital finance saves time for individuals, enabling them to work more hours. We quantified the magnitude of these three channels for each of our seven countries through detailed analysis, and used this as input our macroeconomic model. Overall, we find that nearly two-thirds of the additional GDP potential comes from improved business and government productivity due to digital payments, while one-third derives from increased investment as a result of greater financial inclusion, and the small remainder comes from individual time savings.

We estimated the impact of improved business and government productivity from three sources. First, businesses reap significant time and cost savings from moving to digital payments and reducing the number of manual processes and cash management activities. Second, governments benefit from more efficient operations, lower costs, and reduced leakage in expenditure and tax collection. Finally, we estimate the impact of increased human capital in the economy as a result of more effective government spending on education and health care.

To gauge the increased investment in the economy as a result of broader financial inclusion of people and MSMEs, we first estimated how greater financial inclusion could increase deposits in the formal financial system of each country as individuals shift saving from informal sources into digital accounts. In India, for instance, we estimate there is potential to add nearly $800 billion in deposits due to the country's high level of informal savings today. We then estimated the amount of new investment in each country's capital stock from new credit, taking into account the growth in the deposit base and the starting level of credit and size of the credit gap in the country. We assume that by giving businesses and individuals bank accounts and generating a digital data trail, lenders will be better able to identify good credit risks.

Finally, we estimated how digital finance can free up individuals' time and enable more time for work or leisure, which have direct and indirect impacts on GDP, respectively. According to one study on monthly welfare transfers made to rural households in Niger, payments made via digital means saved an average of one-hour travel time and over three hours waiting time per transfer.[1] We estimate that individuals in emerging economies could save 12 billion hours a year by switching to digital financial services.

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[1] Jenny C. Aker et al., *Payment mechanisms and anti-poverty programs: Evidence from a mobile money cash transfer experiment in Niger*, CDG working paper number 268, July 2015.

Boosting GDP leads to additional aggregate demand and spending throughout the economy, which can increase employment. Based on the historic relationship between real GDP growth and employment in emerging economies, we estimate that this would translate into a 3.5 percent increase in employment across the economy, or nearly 95 million new jobs. Historical trends suggest that two-thirds of these new jobs will be full-time salaried or wage-paying positions that are in short supply in emerging economies.[68]

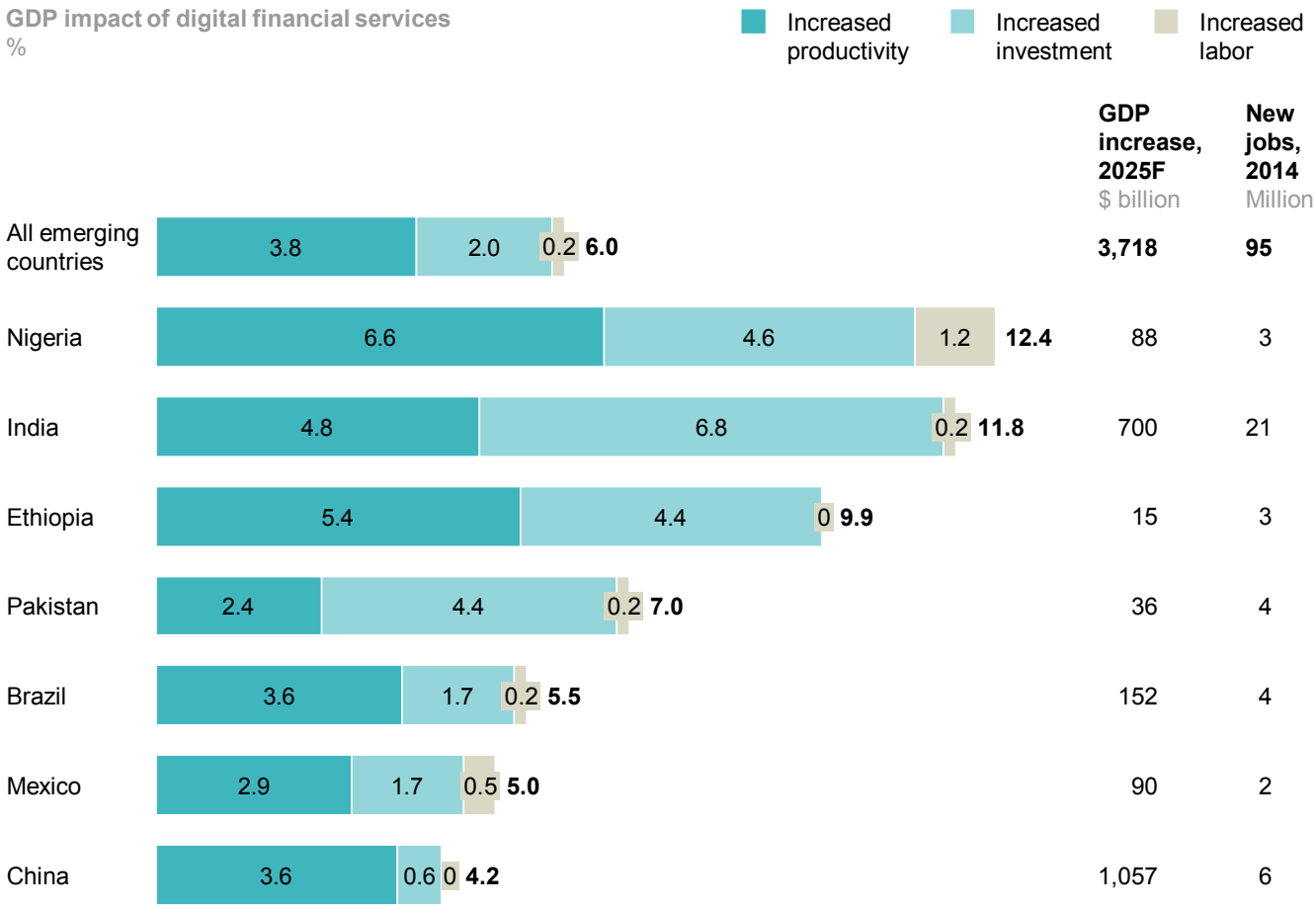
Full details of our methodology and assumptions are described in the technical appendix at the end of this report.

The GDP impact varies a great deal among countries depending on their starting point

The GDP impact varies from country to country depending on each country's starting position on digital payments, financial inclusion, and financial depth. In general, the largest potential impact would be in the least developed countries. Countries with higher levels of income and financial inclusion can capture more modest, but still meaningful, GDP gains (Exhibit 19).

Exhibit 19

GDP impact of digital financial services varies significantly across the seven focus countries



NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

[68] We use data from the International Labour Organisation (ILO) on total employment in developing countries. This is defined as people working for a public or private employer who receive remuneration in the form of salary, wages, tips, or commission, or in-kind. In 2014, they report total employment in developing countries at 2.7 billion people. Salaried or wage-paying positions are a subset of total employment as defined by the ILO.

We calculate that the potential for additional GDP in Nigeria, India, and Ethiopia could be as high as 12.4 percent, 11.8 percent, and 9.9 percent, respectively. These countries' current levels of financial inclusion are low, at 44 percent, 53 percent, and 22 percent, respectively. All have negligible penetration of digital payments—less than 1 percent of total transactions. And in the case of India, there is additional benefit from increased investment in physical capital due to the significant informal saving stock in the country today.

As much as **12.4%** additional GDP potential in Nigeria

The GDP gains for countries at higher levels of income and financial inclusion would be more modest, but they would still be substantial. For Brazil, Mexico, and China, we estimate that the additions to GDP could be 5.5 percent, 5.0 percent, and 4.2 percent, respectively. Brazil and Mexico start with much higher digital payment penetration than other emerging economies researched, at 20 percent and 11 percent, respectively. In addition, these two economies have low savings rates, limiting the opportunity to formalize stocks of informal savings. China starts with high levels of financial inclusion, with 79 percent of adults having an account today, and a large stock of credit in the economy at around 290 percent of GDP.[69] These factors all lead to a more modest growth potential for these countries. However, it should be noted that the opportunity in these countries remains large. In fact, China's overall GDP potential in absolute terms is the largest of all countries estimated—in dollar terms, the $1.1 trillion that could be added to GDP is 28 percent of the $3.7 trillion global opportunity.

The growth potential for Pakistan sits in the middle of the range at 7 percent, somewhat below its lower-income peers, reflecting its unique circumstances. Financial inclusion in Pakistan is extremely low—only 13 percent of adult population has a financial or mobile-money account today. Pakistan's total loans outstanding to all borrowers—household, corporate, and government—amount to only 17 percent of GDP, compared with the average of 112 percent of GDP in emerging economies.[70] This extremely underdeveloped starting position provides significant upside potential to expand its pool of formal savings and credit, however also incurs costs above that of lower-income peers.

DIGITAL FINANCIAL SERVICES HAVE ADDITIONAL LONG-TERM EFFECTS ON GROWTH AND LIVING STANDARDS

$1.1T GDP growth opportunity in China

In reality, we are probably underestimating the full GDP impact of digital finance. There are broader potential benefits that we have not quantified. Taken as a whole, these benefits will contribute to progress toward meeting United Nations development goals (see Box 5, "Digital financial services contribute to progress towards meeting the UN's Sustainable Development Goals.")

- **Raising the quality and quantity of health care and education, leading to improved human capital.** It is well recognized in economic literature that human capital is as important as physical capital in spurring growth, particularly as the knowledge economy grows. Human capital benefits from investment in education and health care. Digital payments and mobile accounts contribute to improved quality and quantity of these services in several ways. As women gain access to financial services and can better control a portion of household income, they tend to prioritize investment in education and health.[71] Micropayments can make school fees more affordable for poor households. Moreover, governments that pay teachers and health-care workers digitally reduce absenteeism, resulting in more and better services. In India, the attendance rate of teachers is 90 percent in states that have reliable digital salary payment systems, but

[69] McKinsey Global Institute Country Debt database.

[70] McKinsey Global Institute Financial Assets database.

[71] Matthias Doepke and Michèle Tertilt, *Does female empowerment promote economic development?* Centre for Economic Policy Research discussion paper number 8441, June 2011.

only 60 to 80 percent in other states.[72] Finally, children who are healthier miss fewer days of school due to illness and are better able to learn while in school than those who are less healthy.

- **Reducing the informal economy.** Digital payments enable greater transparency, which, in turn, helps governments to reduce the size of the large informal economies that exist in many emerging economies today. As we noted in Chapter 1, there is a strong correlation between the dominance of cash in an economy and the size of its informal sector. By creating a record of payments, digital payments can enable governments to improve their enforcement of tax collection and compliance with labor laws—provided governments put in place competitive regulatory and tax policies and strengthen tax collection authorities. One econometric analysis found that increasing electronic payments by an average of 10 percent a year could shrink the size of the shadow economy by up to 5 percent.[73] As also previously noted, reducing the size of the informal economy has significant economic benefits. Prompting informal firms to formalize enables them to invest and grow—or fold—thereby raising the productivity of the entire economy.[74] Of course, governments will have to tread a fine line as they seek to expand digital payments while also reducing tax evasion: sudden step-ups in tax enforcement have been shown to have unintended consequences, including a reduction in the use of digital payments by informal firms that would reverse many of the benefits explored in this chapter.

- **Enhancing liquidity.** As digital payments become increasingly common, more transactions and payments can take place. Rather than savings stashed under the mattress or tucked into wallets, money can circulate more freely and be deployed to fund investment via lending against deposit balances. Overall liquidity in the economy increases.

- **Promoting innovation and new business formation.** As discussed in Chapter 2, digital payments enable a range of new business models to emerge, including new types of financial services, such as P2P lending or new credit scoring methods, micropayment opportunities for the poor, and new digital businesses including e-commerce and on-demand services. All of these enable more entrepreneurship, innovation, and job creation in the economy, spurring long-term growth.

•••

The economic benefits from digital finance are considerable for the full range of stakeholders. In our final chapter, we explore what needs to be done to ensure that those benefits are captured, focusing on three key building blocks.

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[72] *Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, October 2010.

[73] Friedrich Schneider, *The shadow economy in Europe: Using payment systems to combat the shadow economy*, A. T. Kearney, 2013.

[74] See *Eliminando as barreiras ao crescimento econômico e à economia formal no Brasil [Eliminating barriers to economic growth and the formal economy in Brazil]*, McKinsey & Company, June 2004; *How Brazil can grow*, McKinsey Global Institute, December 2006; and Rafael La Porta and Andrei Shleifer, *The unofficial economy and economic development*, Brookings Papers on Economic Activity, Fall 2008.

Box 5. Digital financial services contribute to progress toward meeting the UN's Sustainable Development Goals

Adopting digital payments and financial services can help countries achieve their 2030 Sustainable Development Goals. While digital finance would contribute to nearly all of the 17 major goals in some way, it could have a significant impact on ten of them (Exhibit 20).

Exhibit 20

Digital financial inclusion directly supports ten of the 17 UN Sustainable Development Goals

Goal	Impact from digital financial inclusion
1. No poverty	▪ Poor people and small businesses are able to invest in their future ▪ More government aid reaches the poor as leakage is reduced
2. Zero hunger	▪ Farmers are better able to invest during planting seasons and smooth consumption between harvests ▪ More food aid reaches the poor as leakage is reduced
3. Good health and well-being	▪ Increased government health spending as leakage is reduced ▪ Financial inclusion for women can increase spending on health care
4. Quality education	▪ Digital payments to teachers reduce leakage and absenteeism ▪ Micro tuition payments increase affordability ▪ Financial inclusion for women can increase spending on education
5. Gender equality	▪ Digital reduces women's physical barriers to gaining an account ▪ Women have more control over their finances and their businesses
7. Affordable and clean energy	▪ Mobile pay-as-you-go schemes create access to clean energy ▪ Better targeted subsidies increase use of renewable energy
8. Decent work and economic growth	▪ Greater pool of savings increases lending capacity ▪ Data history of poor and small businesses reduces lending risks
9. Industry, innovation and infrastructure	▪ Digital finance enables new business models and products ▪ More public and private capacity to invest in infrastructure
10. Reduced inequalities	▪ Financial inclusion gives greatest benefit to very poor people ▪ More government aid available as fraud and theft are reduced
16. Peace, justice and strong communities	▪ Digital records of financial transactions increase transparency and enable better monitoring of corruption and trafficking

SOURCE: UN Sustainable Development Goals; McKinsey Global Institute analysis

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4. CAPTURING THE OPPORTUNITY

Business and government leaders in emerging economies need to take concerted measures if they are to capture the potential value of digital finance. Though the path will vary from country to country, three consistent elements or building blocks are required: widespread digital infrastructure, dynamic and sustainable markets for financial-services providers, and products that people prefer to existing, often informal, alternatives.

Addressing each of these building blocks can enable broad adoption of digital payments and other financial products and tools, thereby ensuring that most of the economic benefits we have estimated can be captured. However, additional consideration should be given to ensuring the benefits of digital finance are shared broadly in society. Making sure that these benefits extend to everyone, including the poorest people, those in rural areas, and women, may require additional government measures to overcome a range of market failures.

BUILDING A WIDESPREAD DIGITAL INFRASTRUCTURE

One of the advantages of digital finance is that it can piggyback on existing wireless networks, and is relatively easier to put in place than other types of infrastructure, such as power or transportation. But three primary components are required: mobile connectivity and ownership, digital-payment infrastructure, and widely accepted personal IDs.

Ensuring mobile connectivity and ownership

Just as adoption of mobile phones meant that emerging economies could skip the construction of fixed-line telephony, digital technology now enables these countries to avoid building traditional, physical bank branch and ATM networks. To enable broad access to digital financial services, all people—rich and poor—must own a mobile phone and be able to use it wherever they are. Much of the heavy lifting has already been done: across emerging economies, network coverage is generally high, and phone subscriptions and smartphone ownership are both growing fast (Exhibit 21).

81% of people in Thailand and El Salvador have mobile phone subscriptions—close to **82%** in the United States

Almost 90 percent of people in emerging economies already have mobile network coverage, and a large and increasing share of this is at 3G standard or greater.[75] Poorer and rural areas continue to lack coverage, or may be limited to 2G coverage or have unreliable service due to power outages at base stations, however. In some of these cases, wireless providers may have little incentive to expand network coverage due to low population densities, lack of a dependable electrical supply, or tenuous security situations. Potential revenue in such areas is limited, and capital and operational costs are high. To improve coverage to these areas, government action may be needed.

Mobile phone ownership levels trail coverage levels, but are also growing quickly. In the developing world today, 62 percent of individuals have a mobile phone subscription, equivalent to over 80 percent of adults.[76] Penetration in some emerging economies is near to matching that of developed countries. In Thailand and El Salvador, for instance, 81 percent of their populations have a mobile phone subscription, comparable with 82 percent in the United States and 86 percent in Belgium.[77] Overall, at the current trajectory, 70 percent of

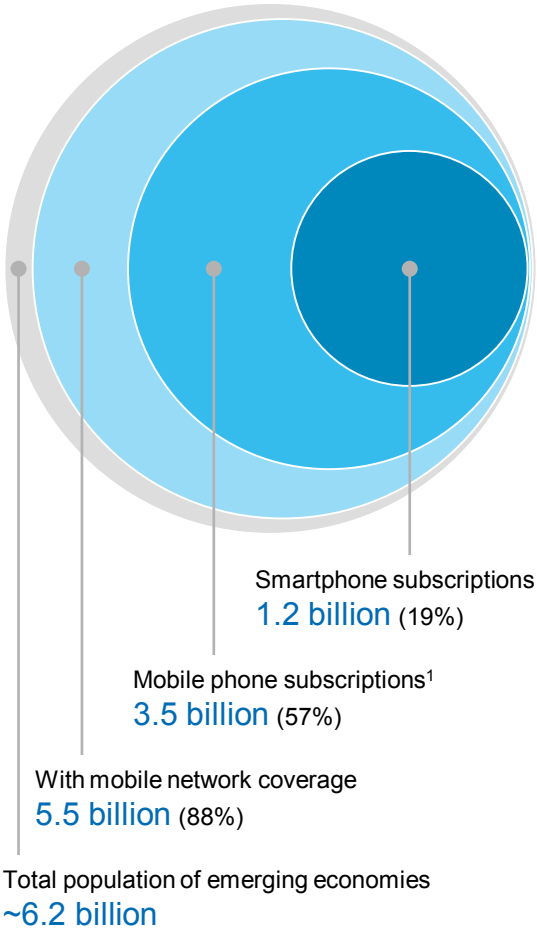
[75] GSMA Intelligence Database, 2016.
[76] Ibid.
[77] Ibid.

the total population in emerging economies—and over 90 percent of the adult population—is expected to have mobile phone subscriptions by 2020. [78]

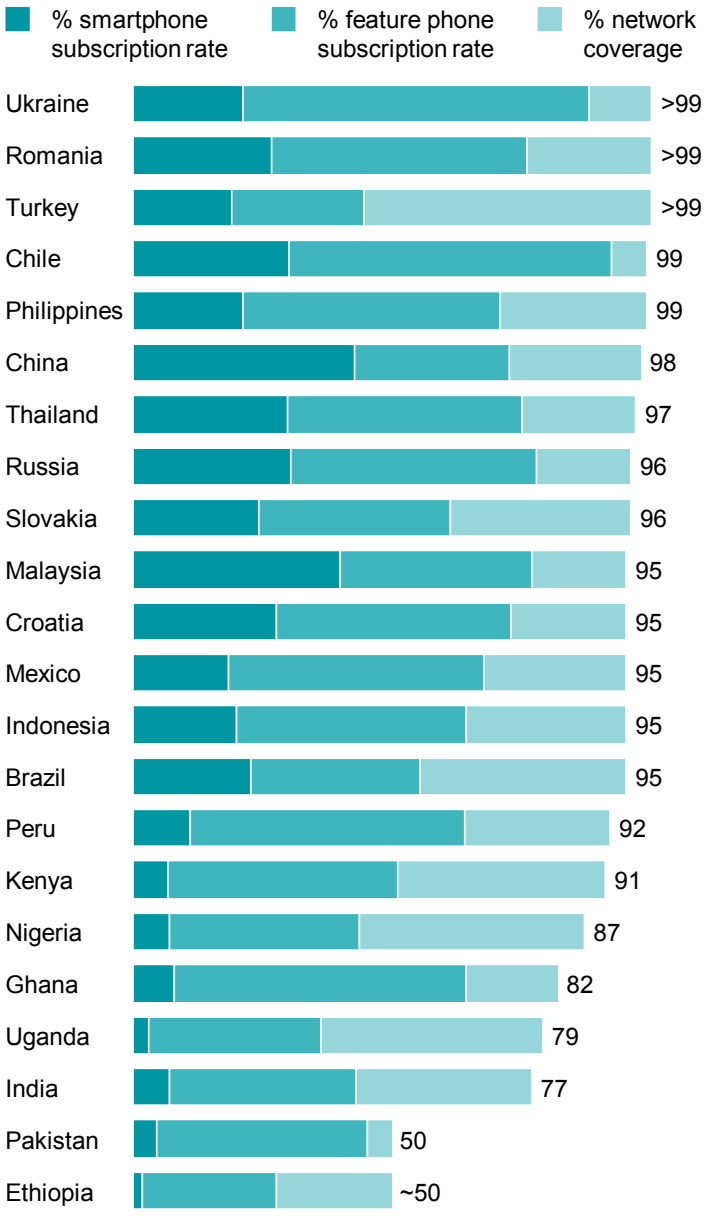
Exhibit 21

Mobile phone subscriptions in emerging economies lag behind network coverage

Mobile technology penetration—emerging economies total, 2014



Mobile technology penetration—by country, 2014
% total population



1 Subscribe via any type of mobile phone.

SOURCE: GSMA; World Bank; Pew Research Center; McKinsey Global Institute analysis

Certain groups continue to have limited or no access to mobile phones. Network operators continue to compete for younger, higher-income, urban customers who provide the greatest potential for lifetime value. In comparison, those who are older, on low incomes, or in rural areas may remain underserved (Exhibit 22). Many have access to phones only through family members or friends. For instance, 30 percent of Indians report having access to a mobile phone only through a family member or friend, and 19 percent of Tanzanians report

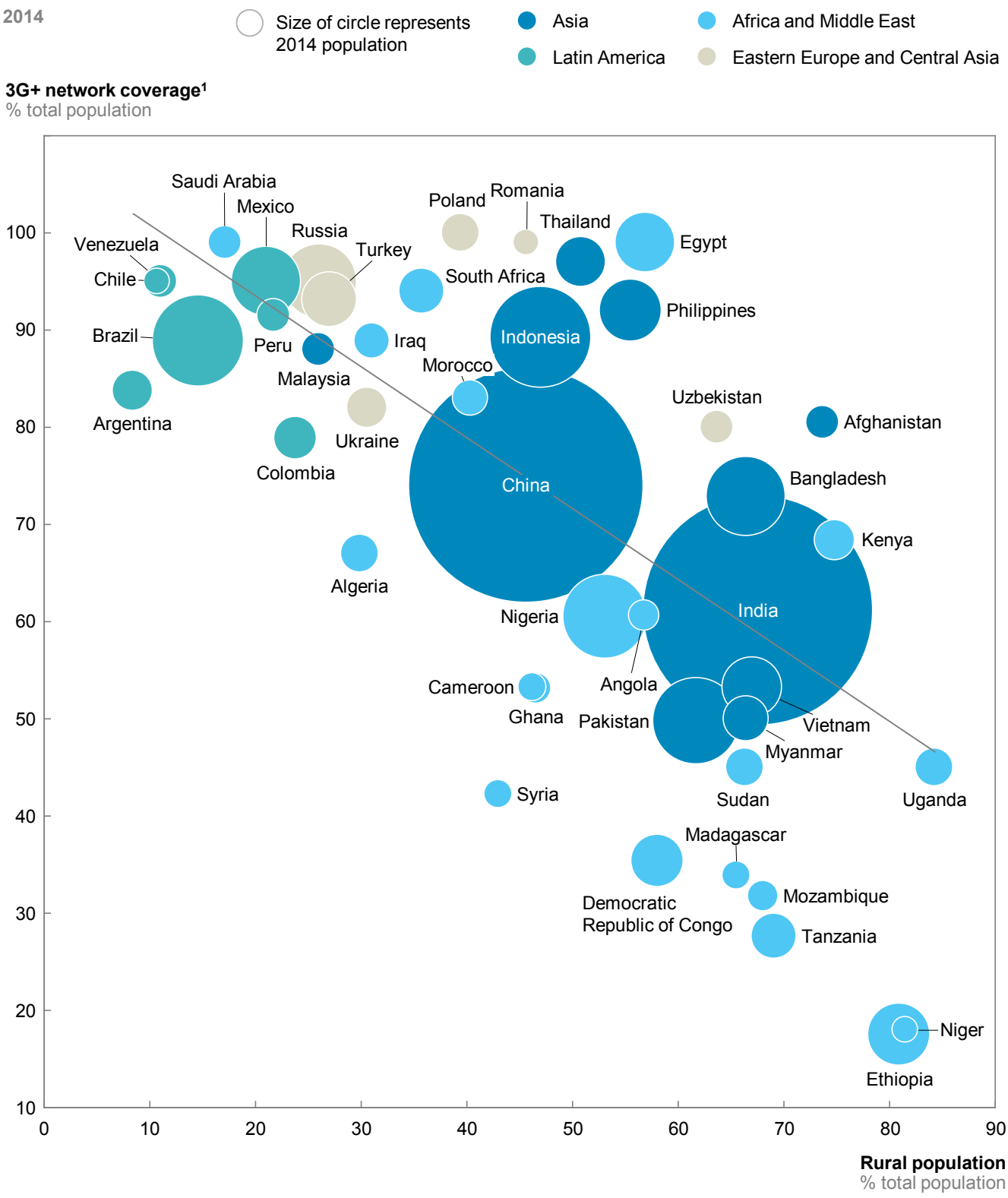
[78] Ibid.

the same.[79] Borrowing a mobile phone provides considerably less control and privacy compared with owning one, a significant impediment to using phones for managing one's finances.

Exhibit 22

Countries with large rural populations have lower broadband coverage

2014



1 Certain countries have significantly increased 3G+ network coverage over 2014-16.

SOURCE: GSMA; World Bank; McKinsey Global Institute analysis

[79] Financial Inclusion Insights by InterMedia.

This is a particular challenge for women who, in most countries, are less likely to own their own phone. In Pakistan, for instance, 78 percent of men own a phone and SIM card, but only 36 percent of women do.[80] There is strong anecdotal evidence that women who borrow phones from their husbands or sons are hesitant to use them for financial services, for example because they do not want to receive texts with information about deposit balances or loan payments.

Widespread smartphone ownership can further encourage adoption of digital finance. Unlike old-fashioned "dumb" phones or even feature phones, smartphones can accommodate sophisticated financial services in a user-friendly way. In most countries—both developed and developing—banks are actively promoting mobile banking apps for smartphones as the number of smartphone users explodes and the cost of these devices plummets. The share of smartphone subscribers in emerging economies rose from 7 percent of the total population in 2012 to 25 percent by 2015 and is expected to reach 45 percent by 2020 and keep growing thereafter.[81] Growth has been rapid—in Myanmar, smartphone subscribers have increased from less than 1 percent of the total population in 2012 to 34 percent today, constituting 70 percent of all mobile phone subscribers. Many middle-income emerging economies now have relatively high smartphone penetration: it is 56 percent in Malaysia and Serbia, for example, and 52 percent in Thailand.

Although smartphone manufacturers are competing fiercely on price, the market dynamics in individual countries will still determine the overall price of device plus data plans, and these can vary enormously (Exhibit 23). Despite impressive growth, smartphone ownership remains rare among poorer and less technologically savvy people in most emerging economies. In some countries, even the most basic smartphone can consume up to 30 percent of an average monthly salary.[82] If financial services evolve in such a way as to require smartphones more quickly than the pace of smartphone price declines, poorer people may be left behind.

56%
smartphone penetration in Malaysia and Serbia

Everyone has a role to play to ensure benefits are broadly shared

While great strides are being made in mobile connectivity and ownership, there is a continuing role for governments, NGOs, and the private sector to ensure that the benefits are broadly shared across society. Efforts should focus on addressing issues around the "edges" of the network, where markets are moving too slowly or failing to address certain gaps, with the aim of tilting the economic case for private-sector players to step in. Examples of interventions include universal coverage preconditions in spectrum licensing agreements, targeted co-investments, and public-private partnerships to develop infrastructure.

One way to expand coverage is for mobile network operators to share infrastructure. Passive network sharing, which involves sharing of sites, masts, and fuel while retaining separate networks, is most common. In some cases, separately created entities have taken on the risks of expanding infrastructure in return for fees charged to each operator. In 2014, there were 64 passive sharing agreements in place in Asia, according to one study.[83] In Myanmar, a tower sharing agreement between Telenor and Ooredoo enabled the two telecoms companies' coverage to expand from less than 10 percent of the population in 2008 to 40 percent in 2014. Active network sharing, which involves sharing both infrastructure and network bandwidth, is less common because it is more complex to

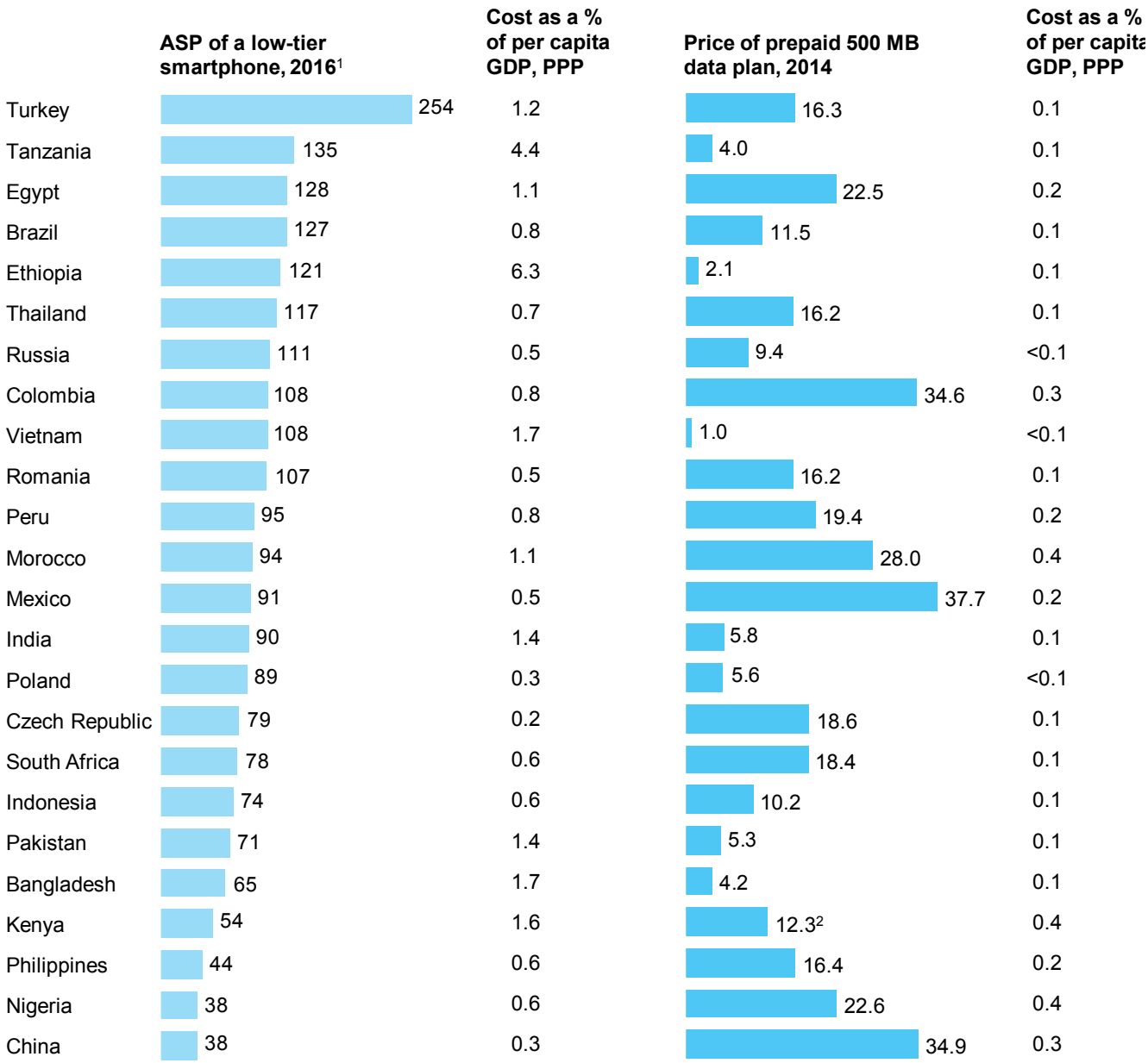
[80] Ibid.
[81] GSMA Intelligence Database, 2016.
[82] Handset cost data from IDC, 2016; monthly wage data from Economist Intelligence Unit, 2013 (2016 estimates).
[83] Tim Hatt, Kenechi Okeleke, and Mike Meloán, *Closing the coverage gap: A view from Asia*, GSMA, June 2015.

implement and may be viewed by regulators as anti-competitive. Nine percent of network sharing agreements in Asia include an active sharing component.

Exhibit 23

The average retail prices of smartphones and data plans vary significantly among emerging economies

Purchasing power parity (PPP), international $


ASP of a low-tier smartphone, 2016[1]
Cost as a % of per capita GDP, PPP
Price of prepaid 500 MB data plan, 2014
Cost as a % of per capita GDP, PPP
Turkey 254 1.2 16.3 0.1
Tanzania 135 4.4 4.0 0.1
Egypt 128 1.1 22.5 0.2
Brazil 127 0.8 11.5 0.1
Ethiopia 121 6.3 2.1 0.1
Thailand 117 0.7 16.2 0.1
Russia 111 0.5 9.4 <0.1
Colombia 108 0.8 34.6 0.3
Vietnam 108 1.7 1.0 <0.1
Romania 107 0.5 16.2 0.1
Peru 95 0.8 19.4 0.2
Morocco 94 1.1 28.0 0.4
Mexico 91 0.5 37.7 0.2
India 90 1.4 5.8 0.1
Poland 89 0.3 5.6 <0.1
Czech Republic 79 0.2 18.6 0.1
South Africa 78 0.6 18.4 0.1
Indonesia 74 0.6 10.2 0.1
Pakistan 71 1.4 5.3 0.1
Bangladesh 65 1.7 4.2 0.1
Kenya 54 1.6 12.3[2] 0.4
Philippines 44 0.6 16.4 0.2
Nigeria 38 0.6 22.6 0.4
China 38 0.3 34.9 0.3

1 ASP is the average end-user (street) price paid for a typically configured mobile phone, including all freight, insurance, and other shipping and handling fees such as taxes (import/export) and tariffs that are included in vendor or channel pricing. Point-of-sale taxes (e.g., VAT or sales tax) are generally excluded. Additional subsidies offered by mobile operators are excluded.
2 2016 data.
NOTE: Not to scale.

SOURCE: IDC Worldwide Quarterly Mobile Phone Tracker, 2016Q1; International Telecommunication Union; World Bank; McKinsey Global Institute analysis

Another approach for expanding coverage is for governments to use state-owned telecoms providers to enact ambitious rural coverage targets. China and Ethiopia are two examples (see Box 6, "Boosting mobile penetration in Ethiopia").

A competitive market structure can help the spread of network coverage and increase the penetration of phone ownership and use by increasing choice and pushing down prices. One study found that competition, privatization and independent regulation were important factors for boosting penetration.[84] And wide participation can bring innovative solutions to the market, for example, Airtel Africa and Thuraya partnered in 2014 to provide mobile coverage via satellite to rural areas in 17 African markets, and Google's Project Loon uses high-altitude balloons to provide broadband network in rural or hard-to-reach areas.

Digital finance needs to be supported by a digital-payment infrastructure

Even if a large share of the population has mobile connectivity, a digital-payment infrastructure is vital to support digital finance. There are several elements of a digital-payment infrastructure. First, a robust digital-payment "backbone" that connects banks, telecoms companies, and other players is needed to clear and settle payment transactions. It has to strike a balance between supporting secure, low-cost transactions and leaving space for financial-services providers to innovate. While national-level payment systems operate in many emerging economies today, these are often inefficient and high-cost, and they connect only limited numbers of users. Second, a wide network of CICO points is needed to give people access to cash when they need it. These CICO networks are inadequate in most developing countries today, where sparse traditional bank branch infrastructure is sometimes the only choice on offer. More lightly regulated banking agents are almost certainly the answer, providing a much less costly way for people to access cash. Finally, countries need widespread POS terminals that accept digital payments, so that customers can replace cash purchases with digital ones.

[84] Yan Li and Bruce Lyons, "Market structure, regulation and the speed of mobile network penetration," *International Journal of Industrial Organization*, volume 30, issue 6, November 2012.

Box 6. Boosting mobile penetration in Ethiopia

Over the past decade, the Ethiopian government has taken targeted steps to expand and improve the quality of the network offered by its state-owned telecoms company, a regulated utility with a monopoly over the market and price setting. In 2006, it contracted with two Chinese companies to expand the network from 1.5 million mobile subscriptions to seven million subscriptions.[1] In 2010, it outsourced management of the company to France Telecom to ensure that the network kept up with growing demand and rising international standards.[2] As a result of such efforts, mobile penetration has increased at an impressive rate. In 2011 the mobile network supported six million subscribers, largely in urban areas; by mid-2016 it boasted near-universal network coverage and supported 46 million subscribers, representing 45 percent of the population and 76 percent of adults. Growth continues, with an additional 1.5 million subscribers signing up every month. This remarkable growth is unlikely to have happened without government investment that included subsidized land and electricity. Ethiopia's plans to improve coverage remain ambitious, and the country is in the process of increasing the minimum level of mobile services in populated areas to 3.75G.

[1] James Thresher, ed., *Ethiopian News*, volume 5, number 2, September and October 2006.

[2] "Telecoms in Ethiopia: Out of reach," *The Economist*, August 24, 2013; "Ethiopian Telecommunications Corporation reborn as Ethio Telecom," *New Business Ethiopia*, December 2, 2010.

A low-cost and interoperable "backbone" digital-payment infrastructure

To enable growth in digital payments in developing countries, a robust digital-payment backbone is critical. This will need to connect "anyone to anyone" and operate at low cost.

Connecting "anyone to anyone" is important to achieving scale and network effects. To do so, the payment systems should feature interoperability, the flexibility to support tiered KYC requirements, and the immediate transfer of funds. Interoperability allows end-users dealing with one payments provider to transact with end-users dealing with a different provider. Accommodating tiered KYC is an important aspect of interoperability—nearly all countries require that people present a minimum amount of identifying information to open an account or send money, and tiered KYC, which involves lower identification requirements for accounts under a certain size, is a cornerstone of many financial inclusion programs. Payment systems should therefore enable seamless transactions between standard and lower-requirement accounts.

Immediate funds transfer, which make funds available in near real time to the person receiving a payment, helps expand the uses of digital payments. Unless immediate or near-immediate transfer is an option, people are unlikely to choose digital payments over cash in many circumstances.

Cost is another important feature of the digital backbone. When transactions are inexpensive to provide, payments companies can charge low prices to consumers without losing money. This in turn allows customers to use digital payments for small-value payments, which are particularly common in the developing world; for example, people may buy 50-gram sachets of cooking oil or pay for just a few kale leaves for as little as 10 cents. Features that can lower the costs of a payment system include capacity for irrevocable "push payments," adopting international payments standards, and undertaking certain activities such as payments processing and fraud management at the system level.

In general, "push" payments that are initiated by the sender, such as Automated Clearing House (ACH) payments, are cheaper to support and less prone to fraud than "pull" payments that are initiated by the recipient of a payment, such as direct debits or credit card payments.[85] Similarly, systems built to process irrevocable transactions tend to run at lower cost than those that allow for reversal of transactions under specified situations. Note that consumer protections still can be maintained with these features. For instance, a push payment can incorporate a message from a merchant requesting payment, and payment providers could offer value-added services that allow for reversals.

Use of internationally accepted payments standards such as ISO 20022 rather than system-specific proprietary standards also helps lower providers' costs. This allows banks and other providers to use the same back-end system for both domestic and international transactions, enhancing efficiency.[86]

A final approach to controlling costs is to perform services that benefit from economies of scale, such as payment processing and fraud detection, at the payment-system level rather than by individual providers. Payment processing requires large fixed costs for buying and maintaining hardware and for developing and maintaining software—performing this at the payment-system level spreads costs over all providers. Moreover, fraud is easier to detect with more data, so shared databases at the system level can significantly improve detection and reduce fraud costs.

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[85] ACH payments are electronic payments created when the customer gives an originating institution, corporation, or other customer authorization to debit directly from a checking or saving.

[86] ISO 20022 is a universal financial industry message scheme. It creates a standardized framework for different systems to communicate with each other to facilitate transactions and other business processes.

Promoting innovation and mitigating risks in the payments "backbone"

Payments systems should balance the needs of innovation with risk mitigation. Payment systems that are more open and encourage all qualified financial-services providers to join help foster product development and innovation, in contrast to more restrictive payment systems that frequently limit participation to select banks. With more participants, open payment systems catalyze innovation from a greater number of players to solve for particular problems and use cases, and also spur established players to expand and improve their services. Exposing system functionality to a wide set of participants through application program interfaces (APIs) further encourages innovation by allowing providers and vendors to embed payment capabilities in their sector-specific services.[87] For example, MasterCard and Visa have both started developing APIs and courting innovative startups and partners to launch new products that tie into their payments gateways. Lower costs are also a potential by-product of open systems, by removing system duplication and the need for interfaces among multiple systems.

32
financial institutions have formed Peru Digital Payments

Broad-reaching, low-cost, open payment systems do come with risks, which must be mitigated through the design of the system. Minimum standards for participation help control fraud, safeguard data, lower chances of system failure, and protect consumers. For example, requirements for end-user authentication help control for fraud, while data protection requirements help protect consumer data. Technical and operating standards help ensure a minimum level of quality for anyone who uses the system and typically include standards for consumer protection. Clear and enforced standards also ensure that the risk profile is well understood and accepted by all participants, helping them manage any residual risk.

Many developing countries' national payment systems, if they have them at all, have been in place for decades, and mix paper and digital processes, and card and non-card systems. Multiple systems may coexist with a mix of costly and not always interoperable connections. These legacy systems were designed for large transactions, rather than the frequent small payments prevalent in the developing world today. Many systems have relatively restrictive rules about which providers can connect, sometimes restricting participants to selected banks, thereby holding back innovation. Fortunately, there has been recent momentum in the development of new and revamped national-level payment systems. In Peru, for example, 32 financial institutions have formed Peru Digital Payments and recently launched Bim, an interoperable mobile payment platform that works with feature phones as well as smartphones. Three major telecoms operators as well as large retailers have joined the scheme.

Revamping a national payment system requires a number of key decisions to be made among stakeholders with consideration of several important trade-offs. The first is whether and to what degree to use existing systems to reduce costs and disruptions—or whether entirely new systems should be built for better long-term outcomes. The second is how to balance the speed and ease of implementation with interoperability. Closed-loop systems with fewer stakeholders can be faster to put in place, but can limit the financial sector's reach and vibrancy in the long run. The third is how to balance costs versus features, including the breadth of transactions accommodated. Finally, stakeholders should take into account the likely trade-offs between fully open systems and greater security, and between flexibility on standards and heightened consumer protection.

[87] An API is a software intermediary that makes it possible for application programs to interact with one other and share data. Open APIs are published on the internet and shared freely.

Only
50
bank branches and ATMs per 100,000 adults in developing countries, vs.
140
in developed nations

Widespread network of CICO points

Even in countries in the vanguard of digital finance, people use cash—in Norway, which has the highest rate of digital consumer payments in the world, the average person withdraws $73 in cash per week. Therefore for digital finance to coexist with cash, a wide network of CICO points is needed. But penetration of traditional CICO points in developing countries today is low—approximately 50 bank branches and ATMs per 100,000 adult residents compared with 140 in developed nations. Moreover, the cost of further building and maintaining this traditional CICO network is prohibitive in countries where balances and transactions tend to be small—research suggests branch and ATM CICO cost an estimated $5.30 and $1.50 per transaction, respectively, in both advanced and emerging economies.[88]

Agent networks can reduce costs and, correspondingly increase reach. Research indicates that in emerging economies, agent CICO costs are under $0.50 per transaction and can as low as $0.10.[89] When existing merchants provide agent services, costs can be even lower, as little as $0.01 per transaction in emerging economies.[90] These merchants already have a customer base, possess valuable local knowledge, and are eager to build their businesses. Governments can encourage emergence of such merchant-located agent networks. And financial service providers can consider partnerships with large retailers and various forms of retail networks to support the rapid growth of such as network.

$5.30
cost per transaction at bank branch, vs. as little as
$0.01
when merchants provide agent services

Widespread merchant acceptance of digital payments

For digital payments to displace cash transactions, merchants must widely offer and encourage the use of digital payments. Strong use of digital payments is empirically linked to widespread merchant acceptance. Traditionally this meant that merchants have needed POS terminals for accepting card payments. However POS terminals cost money to purchase and maintain and merchants typically pay a fee for every card payment they accept. For many merchants in the developing world the economic equation did not add up.

Achieving widespread acceptance of digital payments in the developing world will require proliferation of new technologies and new service models.[91] New technologies leveraging merchants' widespread ownership of phones can lower the cost and increase the convenience of accepting digital payments. At the most basic level, mobile-money services such as M-Pesa make it possible for merchants to accept payment by text. For smartphones, the emergence of mobile point-of-sale (mPOS) technologies allows merchants to link phones to card and contactless readers at costs below those of traditional POS terminals. In India, for example, merchants can purchase an Ezetap mobile phone card reader for around $50. Other technologies may take off in certain locations—Chinese regulators recently approved payments via QR codes, which allow smartphone cameras to create and scan barcodes. Ultimately, the infrastructure needed will be determined by the products that eventually dominate the market (see third building block below).

New service models can also spread acceptance of digital payments, by tailoring solutions to the common challenges merchants face in accepting digital payments. Red Qiubo, a partnership between the baking company Grupo Bimbo and Blue Label Telecoms, provides an example of this happening in Mexico. Red Qiubo leverages Grupo Bimbo's regular contact between its delivery drivers and its small-merchant customers to help its customers accept digital payments. In addition to distributing and maintaining POS terminals, Red Qiubo offers a host of other services to meet its customers' unique needs. In this role, Red

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88 Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems*, Bill and Melinda Gates Foundation, September 2013.

89 Ibid.

90 Ibid.

91 World Bank, *Innovation in electronic payment adoption: The case of small retailers*, Working paper number 106633, June 2016.

Qiubo educates merchants on their use. It also acts as an aggregator and helps open bank accounts on behalf of small merchants who may not have them. To help customers manage lumpy cash as a result of allowing merchants to accept utility payments, delivery drivers can collect cash and deposit it in accounts. And Red Qiubo works on behalf of merchants to create use cases for digital payments by, for example, negotiating with the government to let small-merchant POS terminals accept government food vouchers.

A widely-accepted system of personal IDs is a requirement for safe digital financial transactions

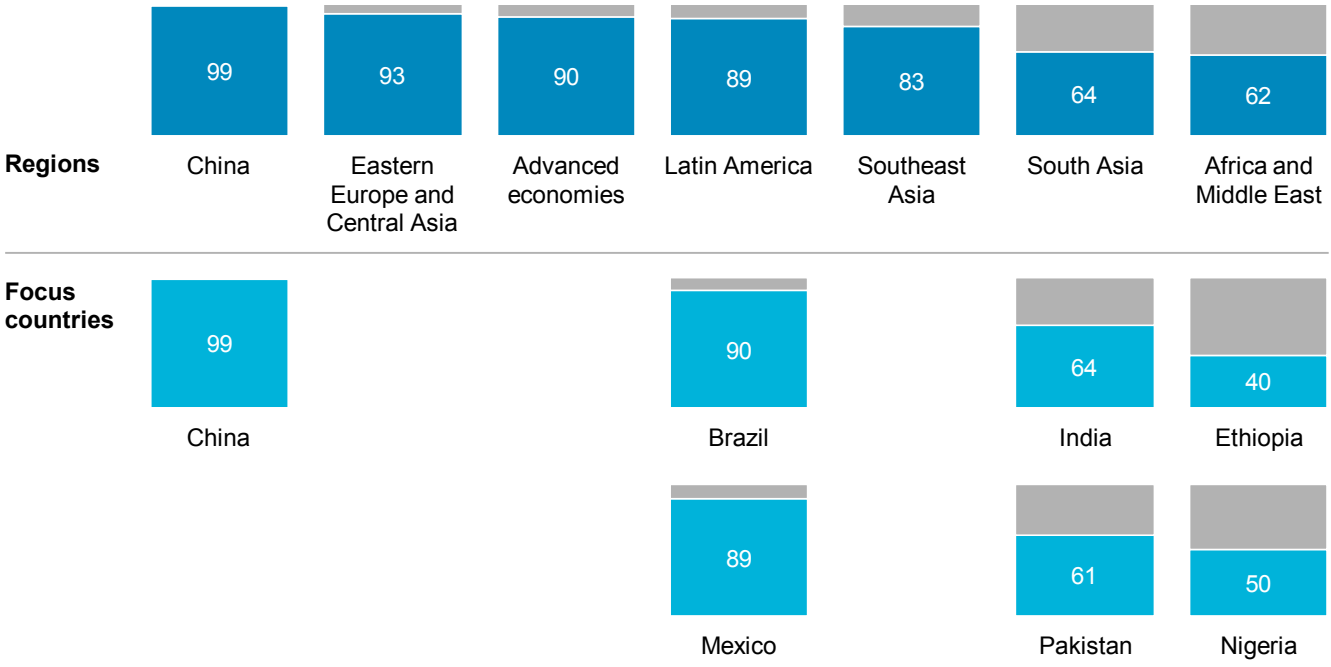
People cannot use formal financial services without some form of identification that enables providers to verify their identity and thereby minimize fraud and satisfy KYC regulations. Yet one in five individuals in emerging economies today remains unregistered in their country, compared with one in ten in advanced economies (Exhibit 24).[92] Even when people have an ID, they cannot register remotely for financial products if that ID cannot be authenticated online or through another digital mechanism. Having a national ID system, whether public or private, and digital authentication are thus essential for enabling digital finance to take off.

Exhibit 24

More than one in five people in emerging economies lack a national ID, compared with one in ten in developed economies

Formal registration rates across all ages by region and focus country, 2014-15
%

20%, or 1.5 billion, unregistered worldwide



SOURCE: Identification for Development (ID4D) dataset, World Bank; McKinsey Global Institute analysis

[92] Identification for Development Initiative (ID4D) global dataset 2014-2015, World Bank, January 2016.

Financial-services providers and customers both gain when their country has universally accepted forms of identity. Providers can design simpler, standardized verification processes and better control fraud. Customers can be confident that a single form of identification will work whenever and with whomever they transact. However, while single national digital ID systems have many benefits, it is also possible for countries to have a broader set of interchangeably acceptable IDs, including voter ID cards, passports, driver licenses, and so on.

Many emerging economies have created national ID programs. Their number is expected to increase from 142 in 2013 to an expected 152 in 2018. However, many countries either lack a national ID system or have one but with low take-up. In Mexico, which does not have a national ID program, the voter ID card has emerged as the primary source of identification. This poses difficulties particularly around elections when there are restrictions on signing up for or renewing cards. In Nigeria a patchwork of public and private ID systems has emerged, and the government has spent more than $2 billion over a ten-year period on disparate ID programs. Despite this, no universal program has developed.[93]

Whichever ID model is chosen, it needs to be used. In Nigeria, none of the major ID schemes has achieved target enrollment levels, and the central national ID system that began issuing identity cards in 2013 has achieved a registration rate of only 5 percent. In general, people will not register if doing so is costly or difficult, and therefore registration is likely to be most fruitful if it is free and physically dispersed so that people do not need to travel. Registration is also more likely if doing so is useful for many activities in both the private and public sectors. The alternative to making registration attractive is for governments to mandate and enforce it, but many lack the will or the resources to take this directive approach.

Nearly
1/2
of the world's population will be covered by digital IDs by 2018

Digital IDs can provide additional benefits for emerging economies. These use a microchip or biometrics such as fingerprints or iris scans to enable a more robust authentication process. The additional authentication they provide serves as a basic security for people who register for financial products. If appropriately designed, the authentication can be done remotely. The identity of the user is checked through authenticating hardware such as microchips or by biometric readers. It can also be paired with a personal identification number. From 2013 to 2018, the number of digital ID programs is projected to increase by 35 percent, from 94 to 127. By 2018, 3.5 billion people are expected to have digital IDs—nearly half of the world's population.[94] As the cost of microchip and biometric technology declines, developing countries are increasingly able to implement digital ID programs. India's Aadhaar biometric ID program is one instance of success. Just over $1 billion has been spent since 2010, and more than one billion people, including nearly the entire adult population, have been signed up by 2016. Estonia's widely accepted digital ID is another.

While many governments voice support for digital IDs, not all have made their development a priority, sometimes because of privacy concerns. Indeed, even the United States, one of the most digitized economies in the world, does not have a national digital ID. Launching a national digital ID is challenging: it requires significant coordination among public- and private-sector institutions to understand each other's requirements and ensure that the ID is affordable and easy to register for. A huge IT, logistical, and marketing effort is essential to launch and encourage high take-up. Given the complexity of such an undertaking, governments need to provide committed leadership and funding.

93 Alan Gelb and Anna Diofasi, *ID for development: Opportunities and challenges for Africa*, Center for Global Development, April 2016.

94 *The global national eID industry report: 2014 edition*, Acuity Market Intelligence, July 2014.

FINANCIAL-SERVICES PROVIDERS NEED DYNAMIC AND SUSTAINABLE MARKETS TO FLOURISH

While widespread digital infrastructure lays a foundation, a sustainable, competitive business environment is then required for a broad range of participants in digital finance. This can include not only banks, but also telecoms companies, mobile handset manufacturers, fintech startups, and other businesses such as those in retail. We find that two aspects are important: implementing risk-proportionate regulation that promotes a stable financial system in which the interests of providers and users are aligned, and fostering innovation and competition.

Putting in place risk-proportionate financial-services regulation

80–90%
of credit losses in China can come from inability to control fraud

Creating a dynamic market that is sustainable through banking and business cycles requires enacting financial regulation that carefully balances the need to protect the interests of investors, consumers, and governments, and giving financial-services providers sufficient space for innovation and competition. To achieve this balance, a number of considerations present themselves.

First is ensuring the stability of the financial system. Prudential regulation such as minimum capital ratios aims to align the interests of financial-services providers with those of the financial system as a whole. To ensure that providers remain healthy, rules and guidance should compel them to control their losses from over-exuberant lending or operational issues, while maintaining stable funding and preserving a sound capital base. Providers must maintain sufficient funding and a capital base through times good and bad, with sufficiently large reserves to absorb possible losses.

Bad loans and operational mishaps are the two main sources of losses for providers of digital financial services. Bad loans are part of doing business for any lender but can contribute to financial instability in an economy. Conversely, excessively tight credit standards can hamper financial growth. Types of operational risk that are particularly relevant to digital financial services include fraud, cyber risk, and other systemic IT failures. Fraud is a particular concern for digital-payment providers; in China, anecdotal evidence indicates that inability to control fraud is the primary source of the high failure rate among P2P lenders and can account for 80 to 90 percent of total credit losses. Cyber events and systemic IT breakdowns are less frequent but more serious, and a growing concern for providers. No one is immune. For example, in February 2016 hackers succeeded in withdrawing $101 million from Bangladesh Bank's account with the Federal Reserve Bank of New York. Systemic IT breakdowns are also unlikely, but potentially severe.

Protecting customer interests is also essential. Regulation needs to ensure that financial-services providers protect consumers, particularly those who are most vulnerable and least economically valuable to the provider. Such regulation should attempt to promote transparent information about products and services (including, for instance, information about up-front fees) and responsible practices so that customers are treated fairly. While digital technologies open the door for many more people to be financially included for the first time, it is essential to avoid "digital loan sharks" and other providers that may seek to profit from these potential customers' lack of experience.

Anti-money laundering regulations is one near-universal type of regulation promoting broader policy aims with rules mandating that banks take measures to detect illicit activity even when this activity poses no direct risk to themselves or their other customers. Another consideration is developing financial regulation that helps to support government funding needs given that bank lending can be an important source of funds, as well as monetary policy aims, and development of priority sectors.

Finally, regulators need to promote fair competition. If regulation is overly burdensome, providers will cease to innovate or compete for customers and everyone will be worse off.[95] Regulations needs to be proportionate to risk, but not more stringent—whether in the case of tiered KYC rules allowing lower identification requirements for smaller accounts, or the granting of e-money licenses to encourage non-bank companies to provide basic financial products in a regulated environment without requiring a full banking license. Competition is strongest when all providers are treated as equally as possible by regulation. Regulators may choose to intervene if different types of players received different treatment without clear commercial justification. For example, in Mexico the government regulator mandated in 2014 that there must be no more than a 5 percent difference in prices charged to different providers to use payments clearinghouses.[96]

Financial market regulators in developing countries have traditionally belonged to one of two camps—those that take a restrictive approach initially and then incrementally loosen regulation in order to avoid stifling innovation, and those that take a hands-off approach initially and then tighten to reduce systemic and consumer-protection risks. India is an example of the first group—historically the Reserve Bank of India (RBI) took a restrictive approach to banking regulation but has gradually been relaxing restrictions on both bank and non-bank financial providers to encourage competition and innovation, in particular to reach poorer customers. Tiered KYC has recently been introduced for new digital accounts in the Pradhan Mantri Jan-Dhan Yojana (Prime Minister's People Money Scheme, or PMJDY) program. In the two years from launching in August 2014, PMJDY has generated more than 220 million new accounts and over $6 billion in deposits.[97] The RBI is now working with non-bank financial entities to launch "payments banks," entities that will sell simple payment and savings products without a full banking license. Kenya, in contrast, belongs to the second group—the M-Pesa mobile-money service was allowed to flourish under the telecoms operator Safaricom when the regulator took a hands-off approach toward mobile money. More recently, however, the Central Bank of Kenya has gradually formalized and tightened regulation of mobile money.

China is a special case with a heavily regulated banking sector and a more loosely regulated non-bank financial sector. Chinese banks have responded by focusing their lending on larger, frequently state-owned businesses, resulting in a majority MSMEs being significantly underserved. In response, a thriving sector of fintech companies and other non-bank financial institutions have proliferated to provide new payment, lending, and credit products to individuals and MSMEs. Over 2013 to 2016, the share of consumer transactions that are digital has increased by 80 percent. Three internet giants—Alibaba, Tencent, and Baidu—have released digital financial-services products, all of which have attracted huge uptake. For instance, 400 million users of Tencent's online social WeChat platform have either linked a bank card to their accounts or maintained a positive account balance in the past three years, and Alibaba can now create credit scores for small businesses based on using online information. Nearly 2,000 P2P lenders have emerged to fill the credit gap. Mindful of the risks of such explosive growth, in particular in forms of credit, Chinese regulators have now started to be more active in encouraging the creation of larger, safer players by, for instance, extending banking licenses to non-bank players.

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95 Jason Lamb and Sacha Polverini, *Assessing risk in digital payments*, Bill and Melinda Gates Foundation, February 2015; David S. Evans and Alexis Pirchio, *An empirical examination of why mobile money schemes ignite in some developing countries but flounder in most*, University of Chicago Coase-Sandor Institute for Law and Economics Research, paper number 723, March 2015.

96 Banco de Mexico circular 18/2014, 2014.

97 Pradhan Mantri Jan Dhan Yojana (PMJDY) website, www.pmjdy.gov.in.

74%
of banking assets in developing countries held by top 5 banks in 2013

Enabling an open market for financial-services innovation

Countries need to create a competitive environment that encourages entrepreneurs, non-bank domestic companies, and foreign companies to bring a broad range of new products and services to the market, offering more choice and more competitive prices to customers.

Retail-finance markets in developing countries tend to be highly concentrated. In 2013, 74 percent of banking assets in these economies were held by the top five banks. Higher levels of bank concentration in emerging economies have been shown to correlate with lower competitiveness.[98] This can result in higher fees for consumers and could reduce banks' incentives to introduce new digital banking products or expand their customer base—and they may seek to prevent other players from entering the market. Allowing a greater range of financial institutions and other players to enter this market with a level playing field is necessary to spur innovations in mobile payments and digital financial services.

Regulation for new entrants must be business-friendly. Developing economies tend to score in the lower end of the World Bank's rankings on the ease of doing business, with particularly poor performance on metrics that relate to spurring innovation including starting a business, enforcing contracts, and resolving insolvency. Governments should therefore consider streamlining business regulation and encouraging competition and investment (including foreign direct investment). Together, governments and the private sector also need to improve the development of human capital, in particular entrepreneurial, business, and technical skills.

An environment that is open for investment and talent is likewise essential. Entrepreneurs across the developing world report that hiring and building their teams is a major challenge, and one that gets more difficult as companies grow. Attracting talent is hard because people with top skills are expensive, there is a shortage of local skills in many markets, and people prefer job security, which means job turnover can be low.[99] Allowing foreign direct investment into the financial sector can bring needed capital, ideas, and talent. Most developing countries have restrictions on foreign ownership of banks and other financial institutions, measures that were often adopted to ensure that the financial sector serves the national interest. But today, these measures need to be weighed against the need to spur innovation and introduce new products that can benefit everyone in society.

Finally, emerging economies need adequate financing to support startups and innovation. Most have only nascent markets for venture capital today. Fortunately, there is a positive feedback loop here. The more digital financial services enable lending products suitable for innovative companies, including lines of credit and cash management solutions, the better able new and existing companies will be to finance innovation in digital finance. To unleash this virtuous cycle may require opening the market for innovation to a broader range of players, including foreign investors.

OFFERING PRODUCTS PEOPLE PREFER TO EXISTING ALTERNATIVES

Even with the infrastructure and business environment needed for digital finance to thrive in place, it is essential not to forget the demand side of the market. People and owners of small businesses choose cash and other informal solutions for good reasons. Cash is simple and intuitive even for people with low financial literacy, and informal solutions are ingrained in local norms and cultures. Therefore, new digital products need to offer significant

[98] Ali Mirzaei and Tomoe Moore, "What are the driving forces of bank competition across different income groups of countries?" *Journal of International Financial Markets, Institutions & Money*, volume 32, issue C, September 2014.

[99] *The human capital crisis: How social enterprises can find the talent to scale*, Ripple Works Foundation, June 2016.

advantages in terms of cost and utility, requiring smart product design and well-tuned policy incentives.

Any digital financial services product needs to appeal to consumers by meeting their needs. At the start of the consumer experience, the product needs to be marketed effectively, be easy to understand, come from a trusted provider, and largely reflect existing consumer behavior. The product also need to be offered at the right price to ensure that consumers find a use for it over the long term. Today, banks in emerging economies are largely geared toward serving the wealthy and larger companies (as we noted in Chapter 1), and products are rarely tailored effectively to lower-income individuals and the middle classes.

450M
users on Alipay platform with annual transactions of
$1T

But awareness of a new digital finance product is far from sufficient to ensure its adoption and use among consumers. In Nigeria, for instance, surveys showed that awareness of mobile money doubled between 2012 and 2014 but adoption remained flat. In Pakistan a lack of awareness of both products and their functions combined with low levels of trust in mobile money has led to high rates of over-the-counter transactions, where individuals do not open a mobile-money account but instead transact using cash through an agent.

There are many examples of successful product development. One is Alipay in China, which was initially developed as a solution similar to PayPal and was associated with the Alibaba e-commerce site. The idea was that Alipay would solve a lack of trust between buyers and sellers on Alibaba by providing customers with an opportunity to validate receipt of their goods before paying, and to safely and securely transfer their money digitally. Twelve years after its creation, Alipay has 450 million users, annual transaction volumes of $1 trillion, and a 73 percent market share of mobile transactions in China, according to iResearch data. The success of Alipay has largely been due to its integration with Alibaba and the system's access to state-owned banks—though China's huge population also contributes to Alipay's absolute size.

Governments can also help. They can identify where there are market failures and create incentives for providers to introduce new products—for example, for the very poor—and encourage uptake—for example, by delivering social program subsidies and other government payments digitally. Making social and other government payments digitally provides an example of one potential way to seed the uptake of digital payments.

•••

Digital finance is already giving rise to a range of innovative ideas and business models. In economies as different as Kenya and China, mobile payments have enabled individuals and companies to flourish in often unexpected and unpredicted ways. Entrepreneurs across emerging economies have established businesses that leverage e-commerce platforms, selling to a global audience. This is just the start. Digital finance has a huge advantage, in that its most essential component—a mobile phone—is becoming ubiquitous. As a result, governments and businesses have an opportunity to build a vibrant digital financial services sector in a relatively short period of time—assuming they implement the these building blocks we have outlined in this report. Putting these in place is likely to be challenging, and governments may have to intervene to overcome current market failures. For some countries, the journey may be long, but it is undoubtedly worthwhile. Wide-ranging digital financial services can transform government, ushering in an era of higher-quality, more efficient service delivery. They can provide significant new markets and a much larger customer base for many types of providers, including financial institutions and telecoms companies but also e-commerce retailers and other participants in the digital economy. Best of all, they can open up a new world of economic opportunity for billions of people and hundreds of millions of businesses currently shut out of their countries' financial systems, and in the process stimulate economic growth and job creation.

FOCUS COUNTRY PROFILES

BRAZIL
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CHINA
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ETHIOPIA
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PAKISTAN
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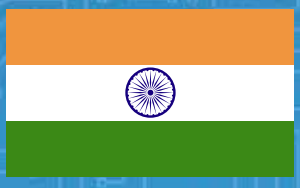
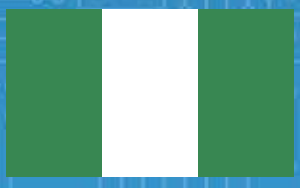
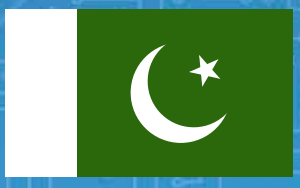
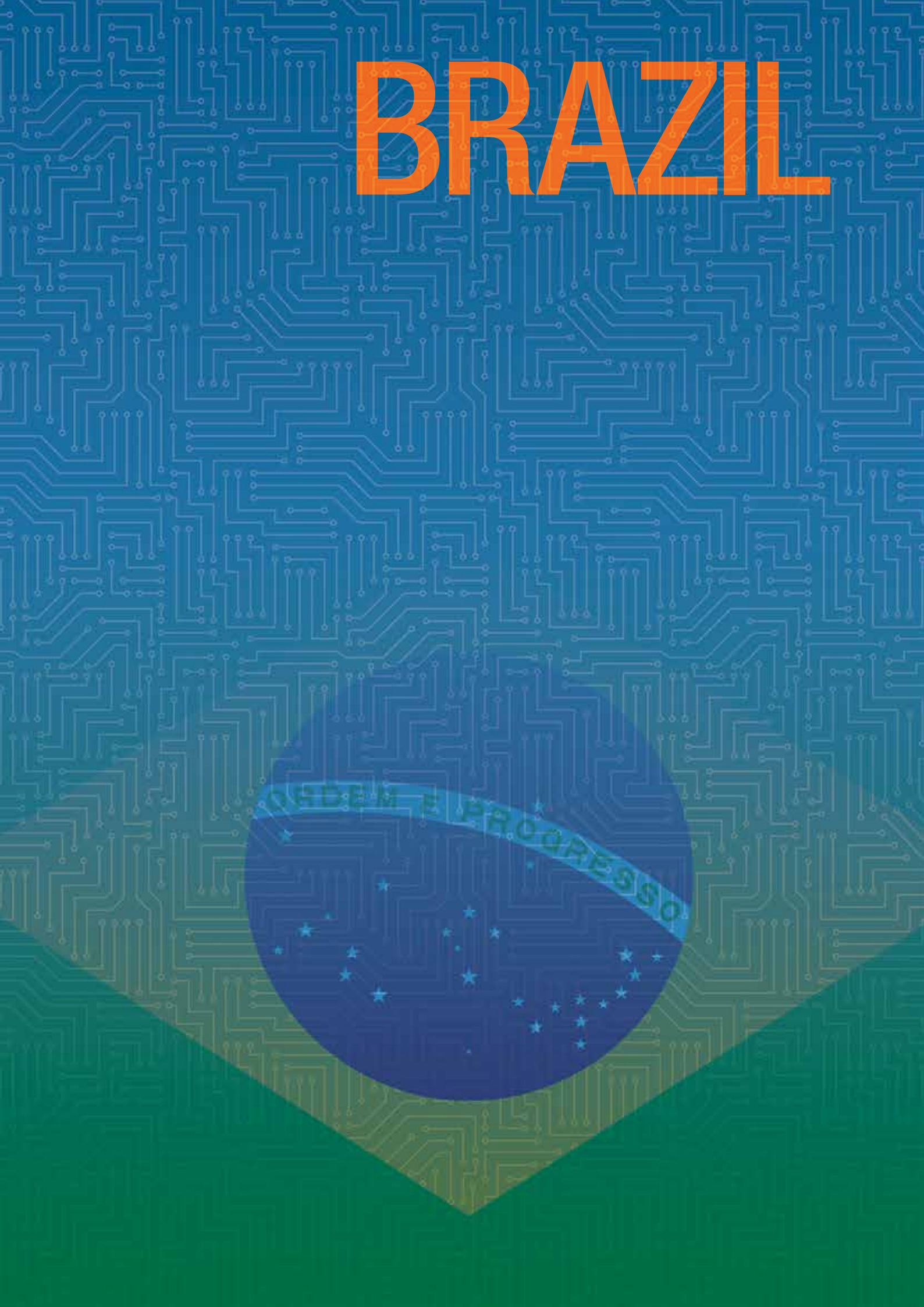


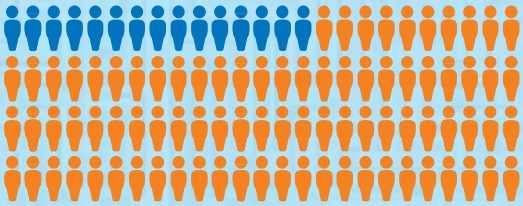
BRAZIL



CURRENT SNAPSHOT

Adult population, 158M

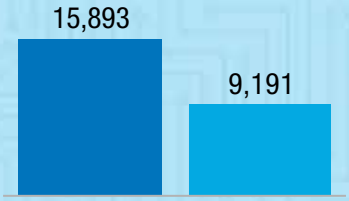
15% rural



85% urban

Per capita GDP

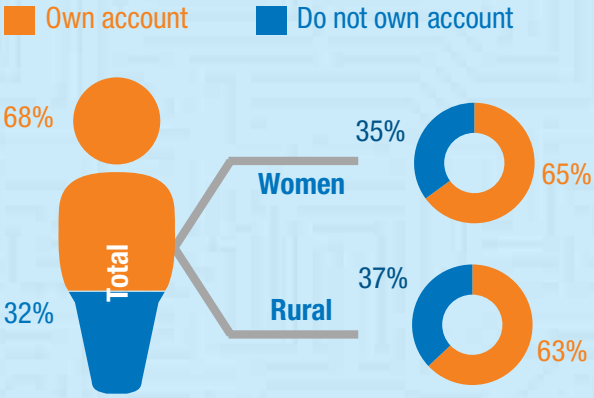
PPP, current international $



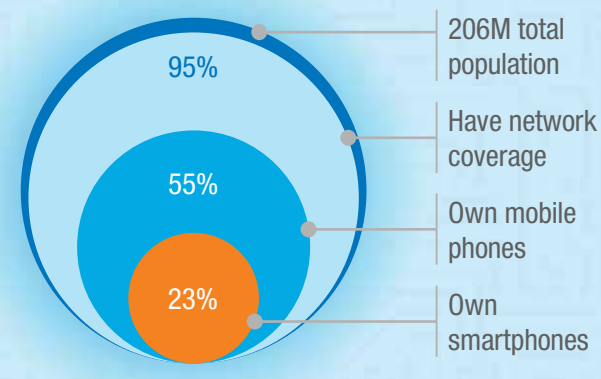
Poorest 40%

Income share held by bottom 40%

Financial account ownership, 158M adults



Mobile technology penetration



MSMEs' access to credit

of 16M MSMEs

Share of digital payments

20%

of total transactions by volume

Mobile-money accounts

<1%

of adults

THE POTENTIAL OF DIGITAL FINANCE

$152B (5.5%)
GDP boost by 2025

35M
Individuals newly included in financial system

$1B
Reduction in government leakage

4M
New jobs

$71B
New deposits

$76B
New credit

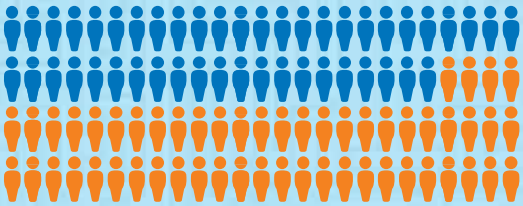
NOTE: 2014 or latest available data for all statistics except GDP boost.

CHINA

CURRENT SNAPSHOT

Adult population, 1.1B

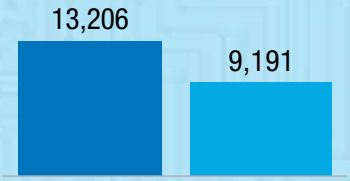
46% rural



54% urban

Per capita GDP

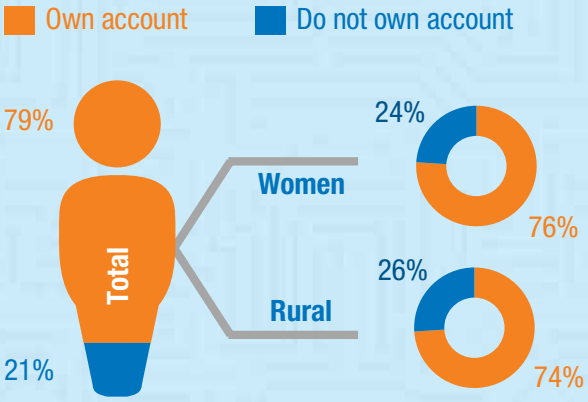
PPP, current international $



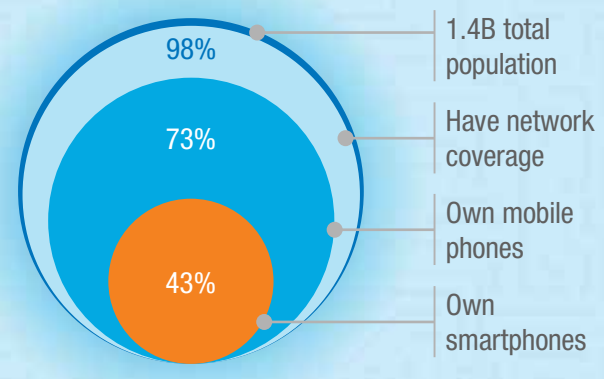
Poorest 40%

Income share held by bottom 40%

Financial account ownership, 1.1B adults



Mobile technology penetration



MSMEs' access to credit

of 104M MSMEs

Share of digital payments

4%

of total transactions by volume

Mobile-money accounts[1]

N/A

THE POTENTIAL OF DIGITAL FINANCE

$1.1T (4.2%)
GDP boost by 2025

132M
Individuals newly included in financial system

$27B
Reduction in government leakage

6M
New jobs

$1.1T
New deposits

N/A
New credit

1 Mobile account penetration data for China are not available.

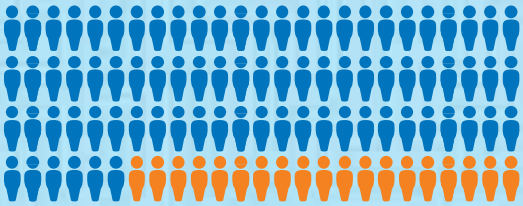
NOTE: 2014 or latest available data for all statistics except GDP boost.

ETHIOPIA

CURRENT SNAPSHOT

Adult population, 56M

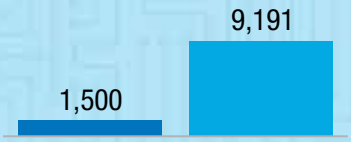
81% rural



19% urban

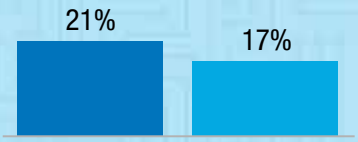
Per capita GDP

PPP, current international $



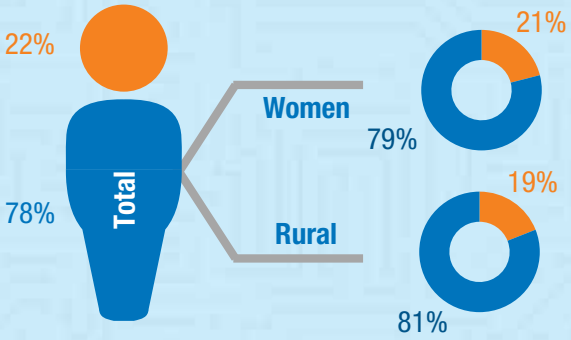
Poorest 40%

Income share held by bottom 40%

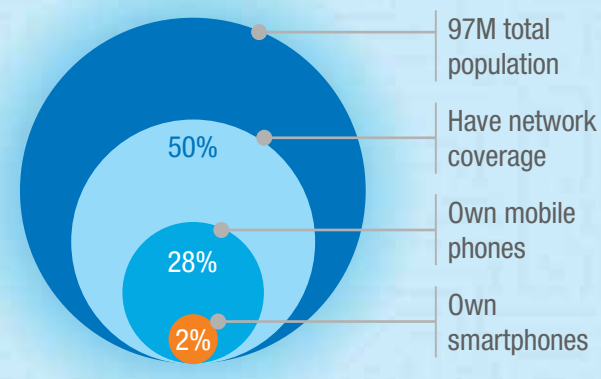


Financial account ownership, 56M adults

Own account | Do not own account



Mobile technology penetration



MSMEs' access to credit

of 2M MSMEs

Share of digital payments

<1%

of total transactions by volume

Mobile-money accounts

<1%

of adults

THE POTENTIAL OF DIGITAL FINANCE

39M
Individuals newly included in financial system

$15B (9.9%)
GDP boost by 2025

<$1B
Reduction in government leakage

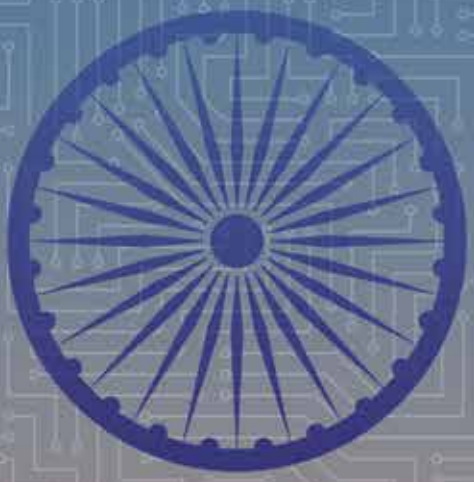
3M
New jobs

$15B
New deposits

$8B
New credit

NOTE: 2014 or latest available data for all statistics except GDP boost.

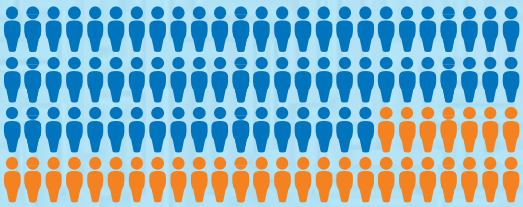
INDIA



CURRENT SNAPSHOT

Adult population, 917M

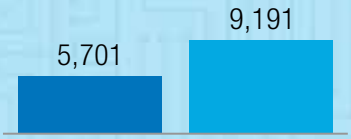
68% rural



32% urban

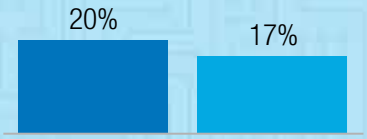
Per capita GDP

PPP, current international $

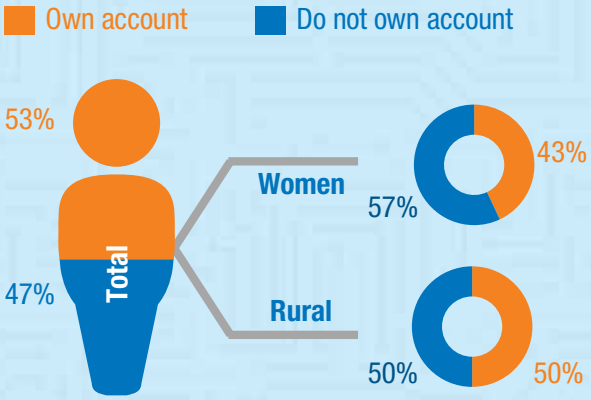


Poorest 40%

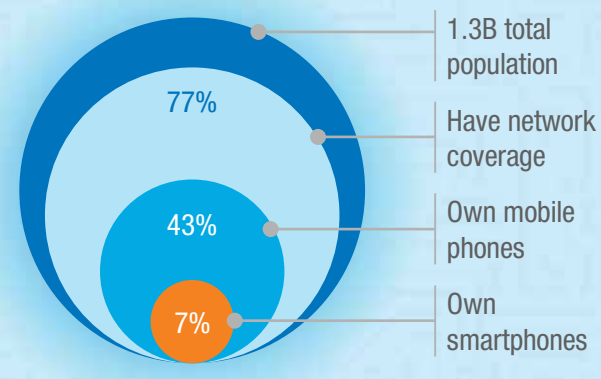
Income share held by bottom 40%



Financial account ownership, 917M adults



Mobile technology penetration



MSMEs' access to credit

of 50M MSMEs

Share of digital payments

<1%

of total transactions by volume

Mobile-money accounts

2%

of adults

THE POTENTIAL OF DIGITAL FINANCE

$700B (11.8%)
GDP boost by 2025

344M
Individuals newly included in financial system

21M
New jobs

$799B
New deposits

$689B
New credit

$24B
Reduction in government leakage

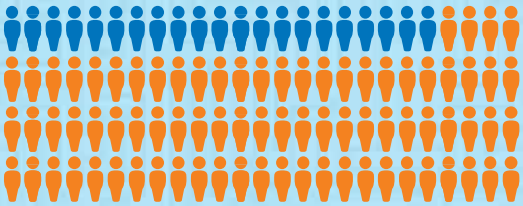
NOTE: 2014 or latest available data for all statistics except GDP boost.

MEXICO

CURRENT SNAPSHOT

Adult population, 90M

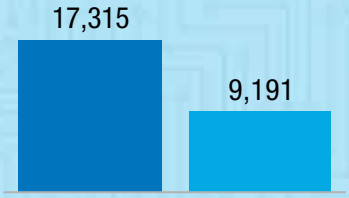
21% rural



79% urban

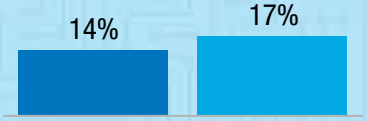
Per capita GDP

PPP, current international $

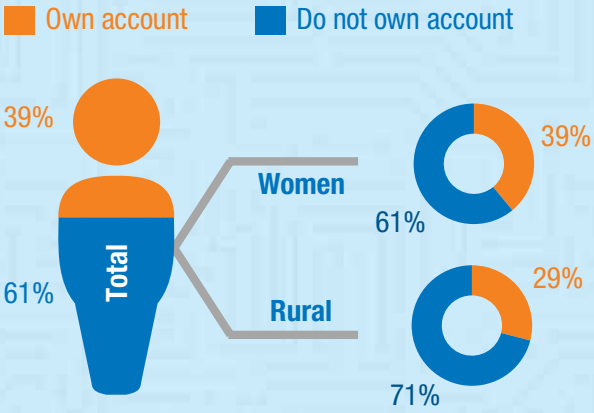


Poorest 40%

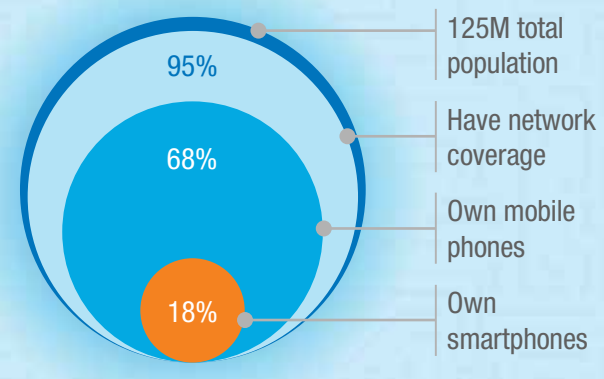
Income share held by bottom 40%



Financial account ownership, 90M adults



Mobile technology penetration



MSMEs' access to credit

of 11M MSMEs

Share of digital payments

11%

of total transactions by volume

Mobile-money accounts

3%

of adults

THE POTENTIAL OF DIGITAL FINANCE

$90B (5.0%)
GDP boost by 2025

46M
Individuals newly included in financial system

2M
New jobs

$142B
New deposits

$162B
New credit

$2B
Reduction in government leakage

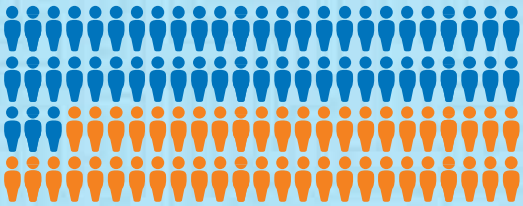
NOTE: 2014 or latest available data for all statistics except GDP boost.

NIGERIA

CURRENT SNAPSHOT

Adult population, 99M

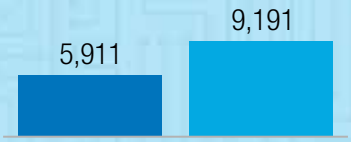
53% rural



47% urban

Per capita GDP

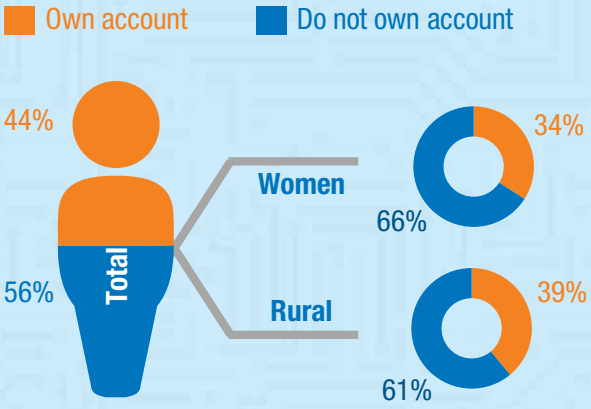
PPP, current international $



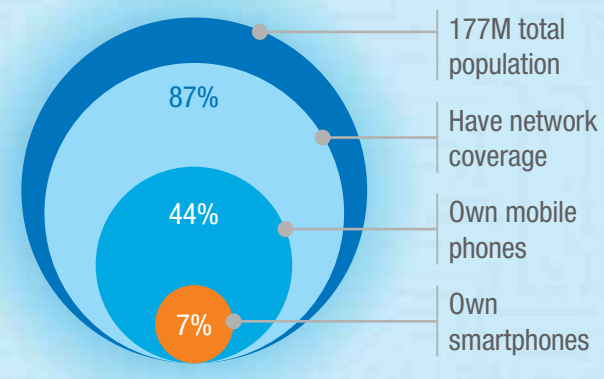
Poorest 40%

Income share held by bottom 40%

Financial account ownership, 99M adults



Mobile technology penetration



MSMEs' access to credit

of 9M MSMEs

Share of digital payments

<1%

of total transactions by volume

Mobile-money accounts

2%

of adults

THE POTENTIAL OF DIGITAL FINANCE

$88B (12.4%)
GDP boost by 2025

46M
Individuals newly included in financial system

$2B
Reduction in government leakage

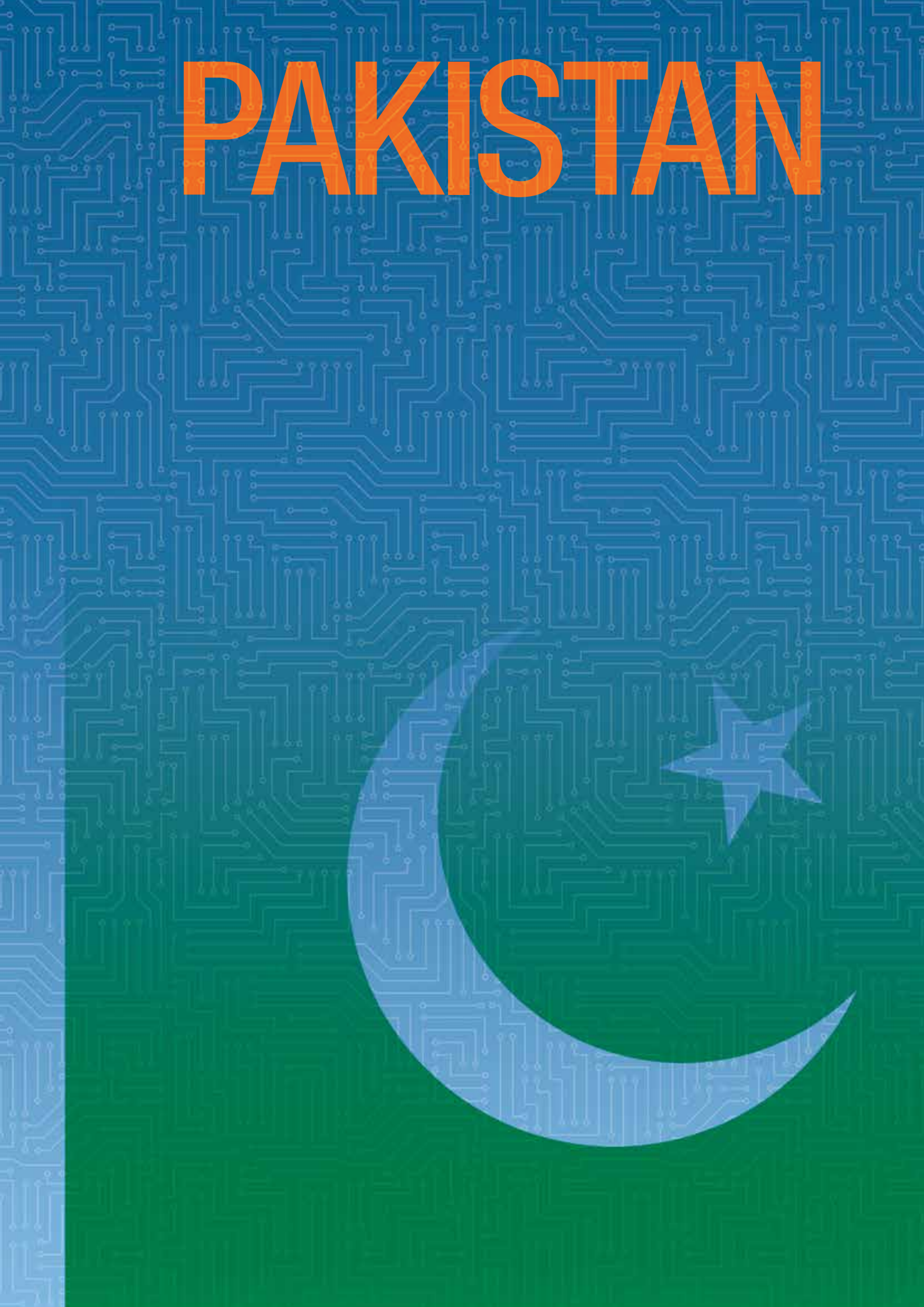
3M
New jobs

$36B
New deposits

$57B
New credit

NOTE: 2014 or latest available data for all statistics except GDP boost.

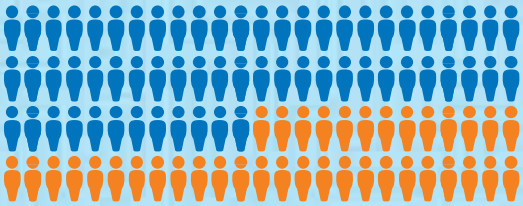
PAKISTAN



CURRENT SNAPSHOT

Adult population, 120M

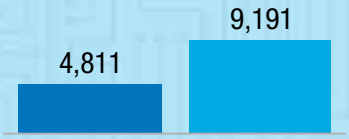
62% rural



38% urban

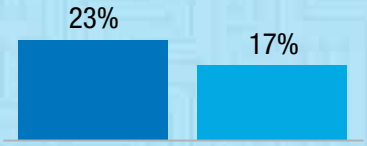
Per capita GDP

PPP, current international $

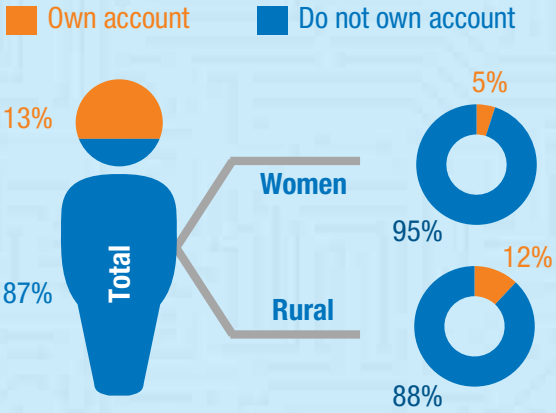


Poorest 40%

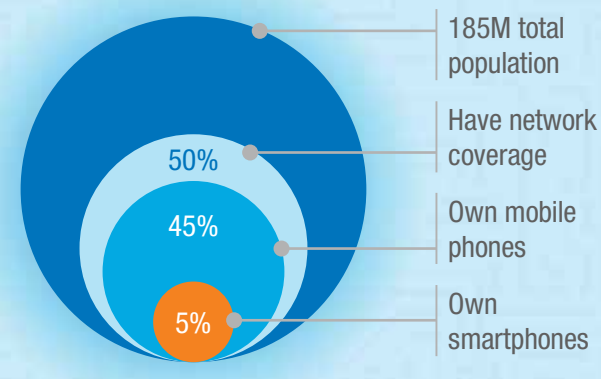
Income share held by bottom 40%



Financial account ownership, 120M adults



Mobile technology penetration



MSMEs' access to credit

of 9M MSMEs

Share of digital payments

<1%

of total transactions by volume

Mobile-money accounts

6%

of adults

THE POTENTIAL OF DIGITAL FINANCE

$36B (7.0%)
GDP boost by 2025

93M
Individuals newly included in financial system

$7B
Reduction in government leakage

4M
New jobs

$263B
New deposits

$23B
New credit

NOTE: 2014 or latest available data for all statistics except GDP boost.

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TECHNICAL APPENDIX

This appendix provides details on the key assumptions, calculations, and data sources employed in our research on the economic impact of digital financial services. It comprises the following three topics:

1. Key assumptions in our research

2. Methodology for estimating the GDP and jobs impact of digital financial services

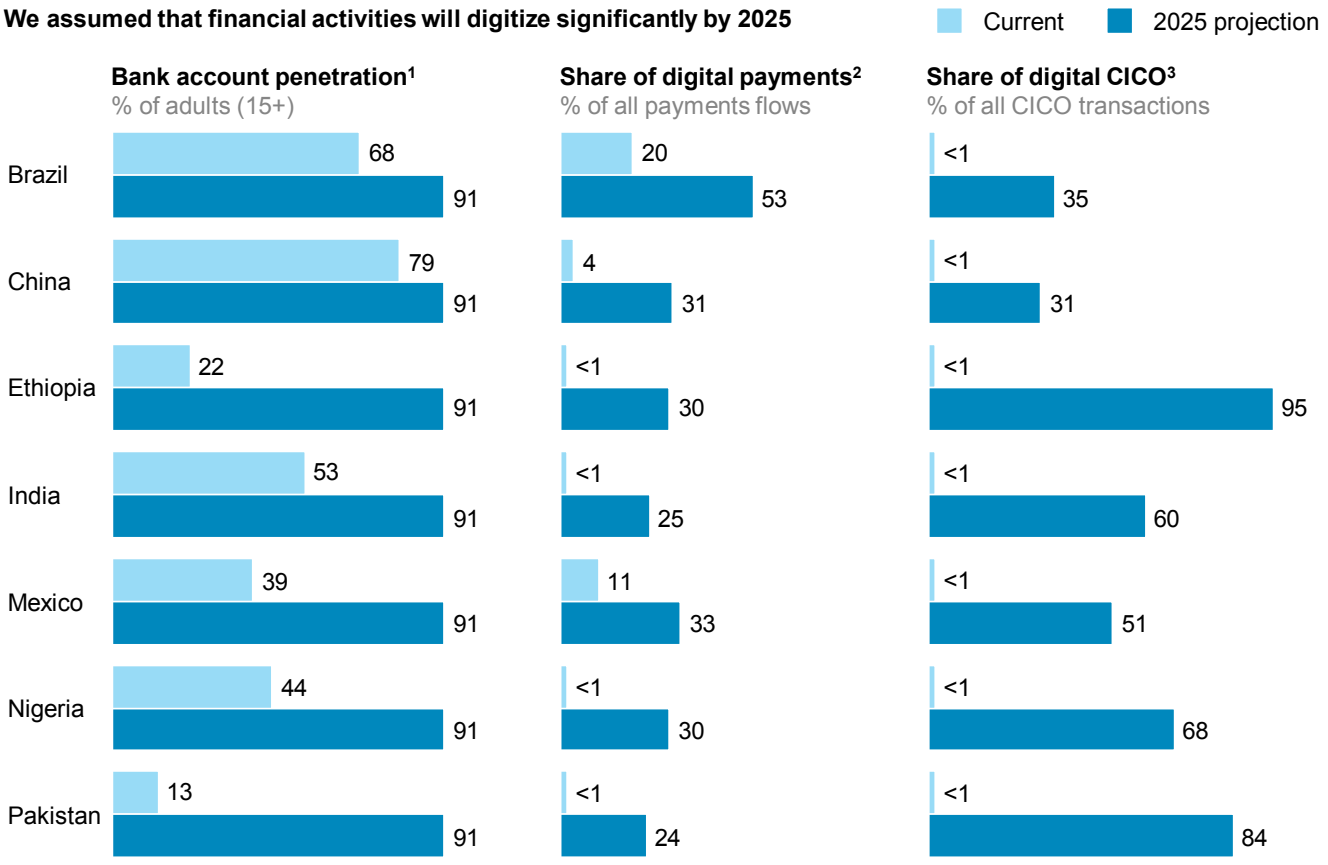
3. Data sources used.

1. KEY ASSUMPTIONS IN OUR RESEARCH

We made three key assumptions about the potential spread of digital finance in emerging economies over the next ten years. We believe that these are ambitious but achievable goals (Exhibit A1).

Exhibit A1

We assumed that financial activities will digitize significantly by 2025



1 Percentage of respondents (15+ years in age) who report having an account (by themselves or with someone else) at a bank or another type of financial institution, or through a mobile-money service.
2 Percentage of all payments flows conducted via non-cash, non-check instruments.
3 Percentage of all cash-in cash-out (CICO) transactions that occur via mobile-money agent or POS terminal.

SOURCE: World Bank; GSMA; McKinsey Global Payments Map; McKinsey Global Institute analysis

Financial inclusion

We assumed that by 2025, use of low-cost mobile technologies will enable developing countries to achieve the same rate of financial inclusion as the average of high-income countries today. According to the World Bank's Financial Inclusion Index (Findex), this means that 91 percent of adults would have access to financial accounts, up from the developing country average of 55 percent today. This includes both formal bank accounts and other types of financial accounts, such as mobile wallets.

We believe this assumption is achievable. First, we expect mobile phone penetration to reach over 90 percent of the adult population by 2025, meaning that much if not all of the new financial inclusion could come through mobile-money accounts and mobile wallets that can be provided at a low cost. In addition, more than 30 emerging economies, such as China and Brazil, have financial inclusion rates of 65 percent or greater. And in some countries mobile accounts already make up a significant share of the total; in Kenya, for example, nearly 70 percent of adults use a mobile-money account.

Percentage of digital-payment transactions

In addition, we made assumptions about the portion of payment transactions that countries can shift to digital technologies by 2025, based on historical trends of countries that achieved a rapid transition to digital payments. We developed target levels of digital transactions that vary by type of counterparty flow:

- **Non-government payment flows** (consumer-to-consumer [C2C], consumer-to-business [C2B], business-to-consumer [B2C] and business-to-business [B2B]): To determine target levels of digital payments, we examined historical data for 44 countries in the McKinsey Global Payments Map from 2007 to 2014 to identify the top-decile percentage point change in digital payments for each type of counterparty flow. We applied the observed annual percentage point change to each country's 2014 digital-payment volume through 2025.

- **Government payment flows** (government-to-person [G2P], person-to-government [P2G], government-to-business [G2B], business-to-government [B2G], and government-to-government [G2G]): We assumed that government receipts and payments can become 100 percent digital in all developing countries by 2025. This assumption is based on what we see for G2P and P2G payments in some developing countries today, including Brazil (98 percent digital), Mexico (90 percent), and China (85 percent).

Percentage of CICO transactions conducted via POS terminal or mobile-money agent

Our last key assumption was on the percentage of CICO transactions conducted via POS terminals or mobile-money agents, versus more costly ATMs and bank branches. We assumed that the percentage of CICO transactions that will be conducted through POS terminals or mobile-money agents, ATMs, and bank branches will be proportional to the projected volume of mobile-money agents, ATMs, and bank branches, respectively. We assumed that the number of mobile-money agents will grow to meet the needs of all additional people with financial accounts, based on the historical growth of agents observed in Kenya. We assumed that the number of ATMs and bank branches will remain at their 2014 levels.

2. METHODOLOGY FOR ESTIMATING THE GDP AND JOBS IMPACT OF DIGITAL FINANCIAL SERVICES

We estimated the potential GDP impact of widespread digital finance using McKinsey's proprietary Global Growth Model for each of the seven countries on which we focused in this research: Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan. We chose these seven because they represent a diversity of regions and stages of economic development. We then extrapolated the GDP impact from these seven countries to the rest of the developing world. Finally, using the projected increase in GDP, we estimated the number of new jobs that could be created, using historical data on the relationship between GDP growth and employment growth in each focus country.

For each of the seven focus countries, we gathered data inputs for the model using a variety of sources. Economic inputs came from publicly available statistics from the World Bank, International Labour Organisation, GSMA, and national governments. We also used proprietary McKinsey datasets, including the McKinsey Global Payments Map and McKinsey Global Banking Pools. (For a complete list of data sources, see the next section of this appendix.) Using these datasets, we built a conceptual microeconomic model of the impact of digital payments and finance on saving, investment, and productivity based on evidence from empirical academic studies. To refine our input data and assumptions, we conducted more than 150 interviews around the world with senior decision makers from a range of digital finance players including banks, telecoms operators, NGOs, fintech startups, government agencies, and regulators.

What is the Global Growth Model?

The Global Growth Model (GGM) is a supply-side general equilibrium macroeconomic model that covers more than 100 countries with data from 1960 through 2015. The structure of the model is anchored in the academic literature on economic growth models. In addition to the common growth drivers of capital and labor, our model incorporates unique features such as education, energy, research and development (R&D), openness to trade, and financial system depth as distinct drivers of growth. The model also incorporates the core features of a comprehensive macroeconomic model, including labor markets, monetary and fiscal policy expectations, and international trade and investment flows.

The model is estimated using dynamic panel "error correction" equations using simultaneous equation techniques to capture interactions among concurrent variables. Validity of the equations is further tested using instrumental variable techniques to control for biased correlations between simultaneously interacting independent variables.

The data underpinning the model are obtained from national governments, authoritative international sources, and datasets such as the Barro-Lee education database that are devised by researchers. These datasets are carefully merged to develop extended time series; where gaps remain, we impute missing data using standard econometric techniques.

The production function used in the GGM is an augmented Cobb-Douglas production function with fixed capital, energy consumption, and human capital as distinct factors of production (Exhibit A2). The production function incorporates a nested constant elasticity of substitution function to capture the imperfect substitution between capital and energy. The coefficients on the Cobb-Douglas are estimated using the dynamic error correction approach noted above.

The human capital index captures both labor supply and the quality of labor in a country. It is defined as the product of employment, average years of education, and an index of work

experience. The fixed capital estimates are derived using a perpetual inventory method and the Harberger approach to calculating the initial stock.[100]

Exhibit A2

McKinsey Global Growth Model's production function

$$GDP_i = TFP_i \cdot \left[\left(a \cdot K_i^{(s-1)/s} + (1-a) \cdot E_i^{(s-1)/s}\right)^{s/(s-1)}\right]^{\alpha} \cdot HK_i^{\beta}$$

Where

- i = 1 to the number of countries
- GDP = Real GDP
- TFP = Total factor productivity
- K = Fixed capital
- E = Total primary energy supply
- HK = Human capital
- a = Capital share
- s = Elasticity of substitution between capital and energy
- α = Output elasticity of capital
- β = Output elasticity of human capital, constrained for constant returns to scale

SOURCE: McKinsey Global Growth Model; McKinsey Global Institute analysis

Feedback loops, or second-order effects, of the GGM

The Global Growth Model's supply-side focus is embedded within a broader macroeconomic system, which captures the various positive and negative feedback loops that can shape long-term growth. The following are some of the most important feedback loops in the model.

Positive feedback loops

- An increase in education levels (holding employment and demographics constant) has a multiplicative impact on overall growth relative to an increase in employment. This is because as the level of human capital rises, the workforce becomes more productive and has a greater ability to utilize new technology. This increases total factor productivity, therefore driving further growth. In parallel, the rise in education levels translates into higher incomes and household consumption, and thus government revenue. The increase in government revenue translates into additional spending on investments such as education and health care, which further augment human capital.

- An increase in physical capital investment increases the overall capital stock and the productive capacity of the economy. An increase in public fixed investment, a proxy for infrastructure, raises the efficiency of private investment and boosts total factor productivity, further driving growth. An increase in physical capital investment also raises expected future growth, which increases the value of equities and the availability of financing in the capital markets. This, in turn, results in further investment, innovation, and total factor productivity growth, thereby boosting overall GDP growth.

- Our model also captures a dynamic in which a decline in the unemployment rate not only increases overall employment (that is, labor supply) but also encourages individuals to re-enter the workforce, raising the labor force participation rate. This further adds to the increase in employment. The increase in overall employment also heightens the ability of the economy to absorb new technology either through R&D (including adopting best practices) or through imports of technology and products from abroad. This also increases total factor productivity and GDP growth.

[100] Michael Berlemann and Jan-Erik Wesselhöft, "Estimating aggregate capital stocks using the perpetual inventory method: A survey of previous implementations and new empirical evidence for 103 countries," *Review of Economics*, volume 65, issue 1, 2014.

Negative feedback loops

- A rise in total fixed capital investment boosts growth, but it also increases demand and inflation. Higher inflation can trigger higher interest rates, which ultimately dampen investment by raising investment cost and lowering the returns on that investment.

- A rise in the government deficit at some point prompts an adjustment in the form of either a reduction in spending or an increase in taxes or other means to boost revenue. A reduction in government expenditure can reflect a decline in public investment, and dampen future GDP growth. A bid for higher revenue reduces the after-tax benefits of investment as well as the disposable income available for consumption. The fall in aggregate demand leads to lower GDP growth overall.

Three main channels of GDP impact: productivity, physical capital, and labor

Widespread adoption of digital financial services will increase GDP through three main channels: increased productivity for businesses, financial institutions, and governments; increased investment in physical capital resulting from additional savings and credit; and increased labor enabled by the reduction in time individuals spend making transactions. We develop detailed estimates on these three channels of impact using microeconomic data and evidence from the academic literature. This section describes the GDP impact channels and drivers in detail and lays out the methodology we used to calculate the inputs into the Global Growth Model.

Overall, our results show that more than 60 percent of the GDP impact from digital financial services is due to increased productivity throughout the economy, and this in turn is due primarily to moving to a digital-payment system. About one-third of the GDP impact is from higher investment in physical capital, reflecting the additional saving and credit made possible by widespread financial inclusion. A small remaining share is from the additional hours of work people can perform (Exhibit A3).

Exhibit A3

GDP impact breakdown by channels and drivers

%

Channel	Driver	Brazil	China	Ethiopia	India	Mexico	Nigeria	Pakistan
Increased productivity	Cost savings for businesses and financial institutions	3.2	2.9	4.6	3.1	2.0	4.8	1.1
	Time savings for businesses	0.5	0.3	0.6	0.6	0.9	1.4	0.1
	Reduced government leakage	0	0.4	0.2	1.1	0	0.4	1.2
	Total productivity impact	**3.6**	**3.6**	**5.4**	**4.8**	**2.9**	**6.6**	**2.4**
Increased physical capital	New physical capital due to additional savings/credit	1.7	0.6	4.4	6.8	1.7	4.6	4.4
Increased labor	Time savings for individuals	0.2	0	0	0.2	0.5	1.2	0.2
	Total GDP impact	**5.5**	**4.2**	**9.9**	**11.8**	**5.0**	**12.4**	**7.0**

NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

GDP impact channel 1: Increased productivity

With widespread digital financial services, businesses, financial institutions, and governments will all experience increases in productivity. The increase comes from three sources: cost savings for businesses and financial institutions, primarily from the digitization of manual cash-based processes; time savings for businesses from a reduction in manual cash transactions with their financial institutions; and reduced leakage in government expenditure and receipts.

Cost savings for businesses and financial institutions

Businesses will save money from digital financial services through reduced theft and errors (known as shrinkage) and improved cash management. Financial institutions will save through reduced account costs, CICO costs, transaction costs, loan issuance costs, and the opportunity cost of currency. Exhibit A4 shows the cost savings in each category for each of the seven focus countries.

Exhibit A4

Cost savings for financial institutions and businesses accrued through the digitization of financial activities

$ million

Cost saving	Brazil	China	Ethiopia	India	Mexico	Nigeria	Pakistan
Reduced shrinkage	2,557	9,438	29	1,946	855	791	619
Improved cash management	993	17,892	180	6,062	360	300	1,597
Account cost reductions	3,846	93,051	(217)	13,832	653	783	(468)
CICO cost reductions	7,006	24,363	2,514	31,928	6,620	6,817	523
Transaction cost reductions	915	(8,221)	(277)	(6,756)	(48)	(423)	(789)
Credit issuance cost reductions	3,669	17,864	33	7,253	753	271	59
Opportunity cost of currency	142	2,311	9	711	188	-	115
Total cost savings	**19,128**	**156,698**	**2,272**	**54,977**	**9,381**	**8,539**	**1,656**

NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

- **Reduced shrinkage.** Shrinkage refers to the amount of cash merchants lose in everyday transactions due to error or employee theft. As more C2B payments are digitized, the loss due to the cash nature of the transactions will decrease. We estimated total current shrinkage in each country using the Centre for Retail Research's 2011 edition of the Global Retail Theft Barometer. We estimated that roughly 25 percent of total shrinkage is due to the cash nature of transactions and thus will be eliminated as transactions become digitized.

- **Improved cash management.** The cost of cash management refers to the cost non-financial merchants incur when receiving, handling, and processing cash payments. As C2B, B2B, and B2C payments are digitized, the cost of each to merchants will decrease. We estimated the cost per transaction and how cost scales with transaction size using a report from the Netherlands Central Bank and benchmark data in six other European countries, Australia, and the United States.[101] We found the cost to be similar in each. The cost of cash to non-financial merchants in the Netherlands bank report includes the cost of depositing and withdrawing cash from the bank (CICO transactions), which we

[101] The six other European countries are Austria, Belgium, Finland, Ireland, Norway, and Sweden.

calculated separately. So we subtracted estimated CICO costs from the total, resulting in a pure cost of cash handling.

- **Account cost reductions.** Digital accounts are less costly for financial institutions to provide and maintain than analog accounts.[102] Financial institutions therefore will save money by switching existing customers from traditional accounts to digital ones—an estimated $15 saved per account.[103] Across all the countries analyzed, we assumed that the administration of all accounts, including sign-up, statement issuance, and transfers, are handled through labor-intensive analog means and that the level of digitization will increase to 100 percent by 2025. However, some of this cost saving from existing accounts will be offset by one-off account acquisition costs incurred in signing new customers—financial institutions will have to spend around $11 per new account. As a result, in countries with very low levels of financial inclusion today, financial institutions will experience low or even negative account cost reductions—that is, total account costs may increase—as they provide new accounts to more customers. This is true for Ethiopia and Pakistan in our sample.

- **CICO cost reductions.** We assumed that as the payment system becomes more digitized, two cash-in, cash-out effects will occur: CICO transactions will migrate from those undertaken in person at branches and ATMs to those undertaken through mobile-money agents and POS networks, and the volume of CICO transactions will increase. We determined the difference between the cost of traditional CICO at ATMs and bank branches and the cost of CICO via mobile-money agents and POS networks using the Gates Foundation's *Fighting poverty, profitably* report.[104] We assumed that current CICO transactions will shift to mobile agents and POS networks, away from ATMs and branches, in proportion with the projected density of agents, ATMs, and branches, respectively, in 2025 in each country. We estimated the volume of additional CICO by assuming that the number of CICO transactions per capita will reach the median level observed in the developed world, at around 26 transactions per person per year. We assumed all new CICO transactions will occur through mobile agent or POS networks. Using this approach, less developed countries that rely more heavily on costly branch CICO transactions today will experience higher relative cost savings than countries that have a higher percentage of less costly ATM CICO transactions.

- **Transaction cost reductions.** Transaction costs for financial institutions include the costs of processing a monetary transaction. We estimated that cash-based transactions are free, but digital transactions can cost around 4 cents each. However, we estimated that check-based transactions cost around $2 each, producing a cost saving of $1.96 when they are replaced by digital payments.[105] We estimated the volume of cash transactions that will digitize using the percentage targets detailed in Exhibit A1. We assumed all check transactions will switch to digital. Countries with a relatively large number of cash transactions will therefore experience a rather high increase in transaction costs, while countries with a relatively large number of check transactions, such as Brazil, will experience rather high cost savings on transactions.

- **Credit issuance cost reductions.** Financial institutions will save on front-office credit issuance costs by digitizing manual processes. Based on US benchmark data, we estimated that loan origination costs in the front office could decline by around

[102] We define accounts as current or overdraft accounts used to facilitate payments through check, debit card, credit transfer, or other means; accounts may also include savings accounts depending on the country.

[103] Rodger Voorhies, Jason Lamb, and Megan Oxman, *Fighting poverty, profitably: Transforming the economics of payments to build sustainable, inclusive financial systems*, Bill and Melinda Gates Foundation, September 2013.

[104] Ibid.

[105] Ibid.

60 percent. We have scaled the absolute cost savings in accordance with countries' average wages, as salaries account for the majority of front-office costs.

- **Opportunity cost of currency.** The opportunity cost of currency refers to the amount of excess currency in an economy that cannot earn interest. We estimated this is equal to the money supply M0. We assumed developing countries can eventually reach the ambitious but achievable M0-to-GDP ratio of Sweden today as they digitize payments. We applied a money market interest rate of 0.5 percent to the reduction in M0 less the national gross savings rate to avoid double counting with the shift from informal to formal savings we captured elsewhere in the macroeconomic analysis.

Time savings for businesses

Businesses will save time by conducting CICO transactions digitally rather than having employees travel to and from ATMs or bank branches. As in our estimate of CICO cost savings, we projected that there will be a shift from CICO transactions at ATMs and branches to CICO transactions at mobile agents and through POS. We assumed transactions at ATMs and branches take both travel and transaction time. We assumed transactions at mobile agents and through POS take negligible time because businesses already conduct activities such as purchasing goods or topping up their mobile phones at these locations. To estimate the time businesses spend on CICO transactions at ATMs and branches today, we first estimated the time of a single ATM or branch transaction. We assumed all business CICO transactions occur in urban areas. We know the total number of branches in each country, and we assumed that they are divided among urban and rural areas in the same proportion as the share of the urban and rural populations that have bank accounts. For ATMs, we assumed there are three ATMs for every branch in urban areas, constrained by the total number of ATMs in the country; we based this assumption on the ratios observed globally. Taking urban areas in each country measured in square kilometers, and assuming that branches and ATMs are evenly distributed in these areas, and that the average person walks at one meter per second, we estimated the average time a business employee travels to make a CICO transaction.[106] The McKinsey Global Payments Map provided the total number of corporate ATM and branch CICO transactions in each country, and we multiply these values to estimate the total average time businesses spend traveling to make CICO transactions. We estimated CICO transaction times using data from the McKinsey Global Payments Map: around one minute for an ATM withdrawal and 15 minutes for a branch withdrawal or deposit.

Reduced leakage in government expenditures and receipts

The final source of productivity increase in our model comes from reduced leakage in government expenditure, such as subsidies, and receipts, such as tax revenue.

- **Reducing leakage from government expenditure.** Leakage in government expenditure includes subsidy payments to an individual who is ineligible under the conditions of the subsidy program, and capture of a payment during its transfer by government officials or other entities. We estimated the leakage rate to be around 5 percent for targeted payments and around 14 percent for non-targeted payments.[107] For G2P (subsidy) payments, we assumed that all flows are untargeted given the fact that validation of recipients is imperfect and impractical in our focus countries. For G2B flows, we assumed that payments are targeted. We assumed 100 percent digitization of government payments and therefore 100 percent reduction in leakage.

[106] Where necessary, we capped the travel time at 60 minutes, assuming that people will likely use means of transportation other than walking such as riding an animal or a motorbike.

[107] *Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, October 2010.

- **Reducing leakage from government receipts.** Leakage in government tax receipts is loss due to corruption and theft by government officials. We calculated this leakage as a percentage of cash value in C2G and B2G payment flows. We estimated the percentage of value lost due to leakage is 5 percent, based on a variety of empirical studies in developing countries.[108] We assumed 100 percent digitization of government payments would eliminate this leakage.

GDP impact channel 2: Increased investment in physical capital

Digital financial services will unlock additional investment in physical capital by spurring an increase in retail and MSME bank deposits, enabling banks to close their loan-to-deposit system slack and allowing banks to use their increased lending base to lend to high-return MSME businesses:

Increased retail and MSME deposit base

With the lower cost of reaching new customers, previously unbanked individuals and MSMEs will gain access to digital financial accounts. Over time, they will shift into the formal financial system a share of their informal savings that are now in cash holdings, physical assets, and informal institutions. Households in many poor countries often have high savings rates necessitated by the irregularity in incomes and lack of a viable social safety net. Therefore, while individual accounts from low-income households may be small, when aggregated across economies they become material. For instance, in India we calculate the potential to add $800 billion in deposits from currently unbanked customers and small businesses, an incremental 64 percent of bank retail deposits today:

- **Individual deposits.** We estimated that newly financially included households will contribute to banks' deposit bases at the same levels that included households do today, accounting for a potential difference in wealth between the two groups. We considered the current level of retail deposits in each country. Then, using World Bank data on the percentage of adults with financial accounts in the top 60 percent of the population in terms of wealth versus the bottom 40 percent, we estimated the average retail deposits per household in each wealth bracket.[109] We assumed that retail deposits are accrued by households in each wealth bracket proportionate to the ratio of the total wealth in each wealth bracket. We projected that the top 60 percent of households and bottom 40 percent of households will be included in the financial system in 2025 at rates observed today in high-income countries. This is consistent with our approach to overall financial inclusion detailed in Exhibit A1. Assuming that households will add deposits to the financial system at the same per household deposit levels observed today in each wealth bracket, we estimated the total additional deposits that newly included households will add to banks' deposit bases (Exhibit A5).

- **MSME deposits.** Additional deposits from small and medium-sized enterprises will result from the formalization of MSMEs currently in the informal economy. We assumed that formalized MSMEs will shift the working capital they keep in their shops today into bank accounts. We also assumed that the current ratio of MSME deposits to MSME revenue will be the same for these newly formalized companies now operating in the informal sector. Using a correlation between the size of the informal economy and the increase in digital payments, we estimated the percentage of informal MSMEs that will formalize as each of our seven focus countries digitizes. We assumed that the average revenue of informal MSME revenue will be equal to the revenue of small (less than 20 employees) formal MSMEs. We then multiplied the total revenue of the newly formalized MSMEs by the deposit-to-revenue ratio of MSMEs currently operating in the formal

[108] Ibid.

[109] For simplicity's sake, we assumed there are two adults per household.

sector to estimate the value of deposits that newly formalized MSMEs will add to banks' balance sheets.

- **Closed system slack and new loans.** Financial institutions in many developing countries do not lend as much as they could, and their loan-to-deposit ratios are below the regulatory limit. Today, the worldwide loan-to-deposit ratio is 96 percent. In countries where this ratio is lower than 96 percent, we assumed that more loans can be made. Digital finance can enable new lending to take place because the cost of issuing loans and collecting payments is lower. More important, digital payments expand the potential customer base by creating digital data records on MSME revenue and payments and on household income streams. As we explain in Chapter 2, this enables new credit scoring methods to assess creditworthiness of potential borrowers. However, too much lending can result in unsustainable credit booms and banking crises. We avoided this by constraining the total increase in loans outstanding to stay below certain thresholds in four areas: the loan-to-GDP ratio, loan-to-bank-reserves ratio, total percentage change in loans, and percentage change in household loans. We assumed that loans will increase from new deposits and system slack until any of these constraints is reached. We constrained the total loan-to-GDP ratio (including loans to governments) to the worldwide average to ensure that the lending base aligns with the wealth of the country. We constrained the loan-to-bank-reserves ratio at 25 times bank reserves to ensure that the lending base aligns with the banking system. (No target country breaches this constraint, as emerging markets tend to have excess reserves, and reserve efficiency increases with development.) We constrain the percentage increase in total loans by 2025 at the worldwide average increase over the past ten years. Finally, we constrain the percentage increase in household loans by 2025 at the worldwide average increase over the past ten years. The last two constraints protect against over-leverage.

- **Higher-return loans to MSMEs.** The returns to lending rise as the availability of borrowers increases. We calculated current returns as the weighted average return on invested capital of major corporations within each country, as the majority of lending today is to large corporations. We assumed new loans will be to MSMEs, whose return on invested capital is larger than that of corporations due to both higher lending rates and higher company returns.

Exhibit A5

Retail deposits will increase as more households are included in the financial system

Cumulative increase in household deposit base as countries reach target account penetration, 2014

Metric		Brazil	China	Ethiopia	India	Mexico	Nigeria	Pakistan
Total current retail deposits ($ billion)		260	8,475	5	1,254	127	40	46
Average deposit per household—by wealth ($)	**Top 60%**	6,738	26,128	1,029	6,498	9,266	2,344	7,227
	Bottom 40%	1,236	6,598	402	2,436	2,206	624	3,196
Number of new households—by wealth (million)	**Top 60%**	8.8	32.4	11.4	93.6	12.8	12.4	28.4
	Bottom 40%	8.9	33.5	8.0	78.1	10.4	10.5	18.1
Increase in retail deposits from households ($ billion)		70	1,068	15	799	142	36	263

SOURCE: McKinsey Global Institute analysis

GDP impact channel 3: Increased labor

Digital financial services will increase labor in the economy because individuals will save time they would otherwise have spent on manual CICO activities. They will be able to reallocate that time toward productive labor activities. We estimated that individuals in developing countries could save 12 billion hours a year by switching to digital financial services.

Our approach to estimating CICO time cost savings for individuals was similar to how we estimated CICO time cost savings for businesses. The key variation in approach is that we assumed individuals make CICO transactions at ATMs and branches in both urban and rural areas today, rather than exclusively in urban areas as we assumed for businesses. Again, we assumed that the total number of branches is divided among urban and rural areas in the same proportion that the urban and rural populations have bank accounts. We assumed that there are three ATMs for every branch in urban areas, and that the rest are in rural areas. We used the same approach as above to estimate the travel and transaction costs for one ATM or branch CICO transaction. To estimate the split of CICO transactions between urban and rural areas, we used the correlation between the number of CICO transactions per account holder and ATM density, which we calculated controlling for urban population, branch density, percentage of adults with a bank account, adult population, and total population. We used this correlation and our estimates of ATM density in urban versus rural areas to estimate the split of total CICO transactions between the two.

Extrapolation to the overall developing world

We define developing countries based on the development of their financial systems, similar to the IMF definition. This differs somewhat from the terminology used by the World Bank Group, which classifies countries as low-income, middle-income, and high-income (Exhibit A6).

We extrapolated the results of the GDP increase from the Global Growth Model of our seven focus countries to 152 other developing countries by first developing a composite score for each country that reflects its level of economic development measured using per capita GDP, financial inclusion, and access to mobile phones. We then divided these countries into three groups based on the score. For countries with a high score, we assumed that the GDP impact would be the average of the two high-scoring focus countries, China and Brazil. Countries with a score in the middle range were mapped to the average outcome of India, Mexico, and Nigeria. Countries with low scores were mapped to the impact found in Ethiopia and Pakistan.

Impact on employment

We also conducted analysis to understand the impact of the additional GDP from digital finance on overall employment in the country. This employment constitutes the jobs created across all sectors of the economy from increased GDP; it is not related to the increase in labor that is an input to our macroeconomic model. Using data from the International Labour Organisation on total employment in developing countries, we used a regression analysis to determine the relationship between real GDP growth and total employment for each of the seven countries. We then applied the coefficient from this relationship to our total GDP growth estimate to determine the increase in employment. Impact of GDP growth on employment varies significantly across our focus countries. In China, for example, a 1 percent increase in GDP results in a 0.2 percent increase in employment, whereas, in Pakistan, a 1 percent GDP growth results in a 0.9 percent increase in employment. We scaled these estimates of job creation in the seven focus countries to the rest of the developing world using the extrapolation approach discussed above.

Exhibit A6

Classification of developed and developing countries by region

Scope of our research

	Europe, Middle East, and Africa	Americas	Asia
Developed countries	**Western Europe** Germany, France, United Kingdom, Italy, Spain, Netherlands, Belgium, Greece, Portugal, Sweden, Austria, Switzerland, Denmark, Finland, Norway, Ireland, Luxembourg, Malta, Iceland	**United States and Canada** United States Canada	**Northeast Asia** Japan South Korea **Other developed Asia** Australia New Zealand Singapore Taiwan Hong Kong Macao
Developing countries	**Eastern Europe and Central Asia** Russia, Turkey, Ukraine, Poland, Uzbekistan, Romania, Kazakhstan, Czech Republic, Hungary, Azerbaijan *Plus 22 other countries* **Middle East and Africa** Nigeria, Ethiopia, Egypt, Iran, South Africa, Tanzania, Kenya, Sudan, Algeria, Uganda *Plus 52 other countries*	**Latin America** Brazil, Mexico, Colombia, Argentina, Peru, Venezuela, Chile, Guatemala, Ecuador, Cuba *Plus 26 other countries*	**China** **South Asia** India, Pakistan, Bangladesh, Afghanistan, Nepal, Sri Lanka, Bhutan, Maldives **Southeast Asia** Indonesia, Philippines, Vietnam, Thailand, Myanmar, Malaysia, Cambodia, Papua New Guinea *Plus 12 other countries*

SOURCE: McKinsey Global Institute analysis

3. DATA SOURCES USED

This section details the key sources we have used for our macroeconomic model. These include the sources used to develop the GGM, details behind the proprietary McKinsey Global Payments Map, and a list of sources that support our key calculation metrics.

- **Data sources for GGM.** The following sources were used in developing McKinsey's GGM:
  - Bank for International Settlements International Banking Statistics
  - Barro-Lee Educational Attainment database
  - IMF International Financial Statistics
  - International Energy Agency Energy Balances
  - International Labour Organisation ILOSTAT
  - McKinsey Global Institute Financial Assets database
  - OECD databases
  - UN World Population Prospects
  - UN System of National Accounts database
  - UN World Income Inequality database
  - UNIDO Industrial Statistics database
  - World Bank Global Financial Development database
  - World Bank World Development Indicators (2016 and multiple vintages)
- **McKinsey Global Payments Map.** A key source for our analysis of the channels of GDP impact was the McKinsey Global Payments Map, a database covering a variety of topics in the payments business. Among them are payments flows (volume and value), revenue and costs generated through payments, and stocks of payments-related equipment (for example, number of cards). The map is assembled from more than 200 sources, including both proprietary McKinsey research and secondary research, which includes central bank studies, individual bank reports, and Retail Banking Research's global cards data. The map draws on data from 43 countries generating more than 90 percent of global GDP and roughly 95 percent of worldwide payment revenue. By applying consistent definitions and measurements across different geographies, the Global Payments Map is able to provide a globally consistent view of the payments industry. In this report, we used the 2014 release of the map.
- **Other data sources.** To develop the inputs to GGM, we used a variety of sources across publicly available datasets, data from national governments, and proprietary McKinsey knowledge (Exhibit A7).

Exhibit A7

Our analysis draws from a variety of public and private data sources

Macro analysis component	Metric	Source
Overarching	Account ownership[1]	World Bank Global Findex database, 2014
	Mobile account penetration	World Bank Global Findex database, 2014
	Mobile network coverage	GSMA, 2016
	Mobile and smartphone subscribership	GSMA, 2016
	Number of MSMEs	SME Finance Forum, IFC Enterprise Finance Gap database, 2011
	MSME access to credit	SME Finance Forum, IFC Enterprise Finance Gap database, 2011
	Financial depth	MGI Financial Assets database, 2015
	Financial behavior at the bottom of the pyramid	Collins et al., *Portfolios of the poor*, 2010; Banerjee and Duflo, *Poor economics*, 2011; CGAP; many additional in bibliography
	Employment	International Labour Organisation, 2015
	Population	World Bank Health Nutrition and Population Statistics, 2016
	Other economic indicators	World Bank, IMF
Increased productivity	Volume and value of payments	McKinsey Global Payments Map, 2016 (2014 data)
	Share of digital payments	McKinsey Global Payments Map, 2016 (2014 data)
	Business shrinkage	Centre for Retail Research Global Retail Theft Barometer, 2011
	Cost of cash management	*The costs of payments: Survey on the costs involved in POS payment products*, Netherlands National Forum on the Payments System, 2004; McKinsey payments benchmarks
	Cost of a bank account	*Fighting poverty, profitably*, Bill and Melinda Gates Foundation, 2013
	Cost of CICO	*Fighting poverty, profitably*, Bill and Melinda Gates Foundation 2013
	Volume and value of CICO transactions	McKinsey Global Payments Map, 2016 (2014 data)
	Cost of transactions	*Fighting poverty, profitably*, Bill and Melinda Gates Foundation 2013
	Loan origination costs	Bank Administration Institute (BAI) Banking Services, 2015; McKinsey banking benchmarks
	Density of ATMs, branches, and POS	World Bank Global Findex database, 2014
	Density of agents	World Bank Global Findex database, 2014
	Government leakage	*Inclusive growth and financial security: The benefits of e-payments to Indian society*, McKinsey & Company, 2010
Increased investment in physical capital	Retail and SME deposits	McKinsey Panorama Global Banking Pools, 2016
	SME revenue	World Bank Enterprise Survey, 2016
	Bank system slack	EIU Market Indicators, Loan and deposit data, 2016; IMF Financial Soundness Indicators, 2015
	Corporate return on capital	McKinsey Corporate Performance Analysis Tool (CPAT)
	SME return on capital	IMF International Financial Statistics, 2016; McKinsey Panorama Global Banking Pools, 2016; Dalberg, *Report on support to SMEs in developing countries through financial intermediaries*, 2011
	Private-sector debt	MGI Country Debt database, 2015
Increased labor	See “Density of ATMs, branches, and POS” and “Density of agents” metrics	

1 Includes breakdowns by wealth, gender, urban vs. rural, and so on.

SOURCE: McKinsey Global Institute analysis

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